JUNE 1960

IN THIS ISSUE:

Humidification pays for itself in first year 13
How to check elbow insulation crack 14
Over 70 catalogs for your library 38

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How Eastman Kodak gets it for film processing is told by A.C. Bailey, Head of Lake Water Dept., Utilities Div.

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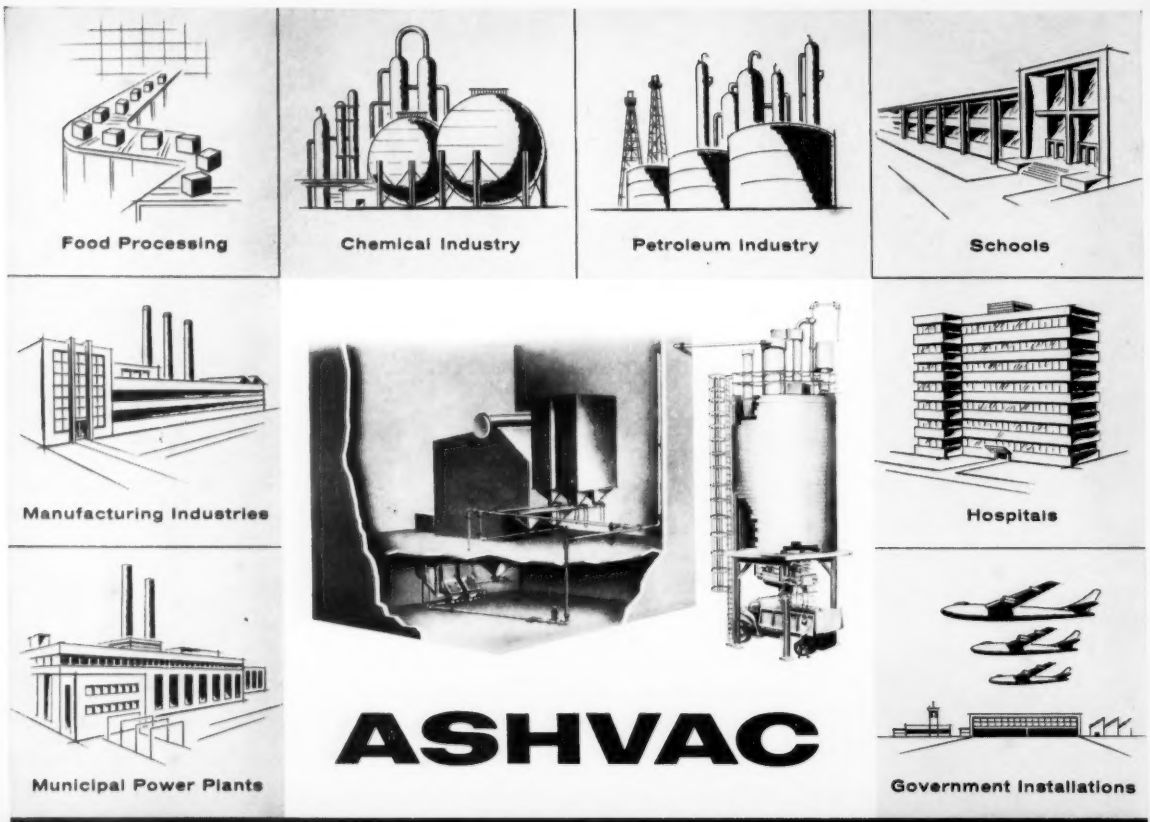

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the **Allen-Sherman-Hoff** company

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Offices and representatives in principal cities

For more information, circle 9496 opposite back cover.

CONVENTIONS AND EXHIBITS

June 6-9: Annual Meeting of National District Heating Association; Grove Park Inn, Asheville, North Carolina.

June 13-15: Annual Meeting of American Association of Cost Engineers; Rice Hotel, Houston, Texas.

June 6-17: John Hopkins' Management Course in Operations Research & Systems Engineering; Homewood Campus of John Hopkins University, Baltimore, Maryland.

June 20-22: ASME Applied Mechanics Conference; Pennsylvania State University, University Park, Pennsylvania.

Aug. 14-17: AIChE-ASME Heat Transfer Conference and Exhibit; Statler Hotel, Buffalo, New York.

Sept. 7-9: ASME Instruments & Refrigeration Conference; M.I.T., Cambridge, Mass.

Sept. 15-16: ASME Engineering Management Conference; Morrison Hotel, Chicago, Ill.

Sept. 18-21: ASME Petroleum Mechanical Engineering Conference; Jung, New Orleans, La.

Sept. 21-23: ASME-AIEE Power Conference; Bellevue-Stratford, Philadelphia, Pennsylvania.

Sept. 26-30: Annual Meeting ISA Instrument-Automation Conference and Exhibit; New York Coliseum, New York, N.Y.

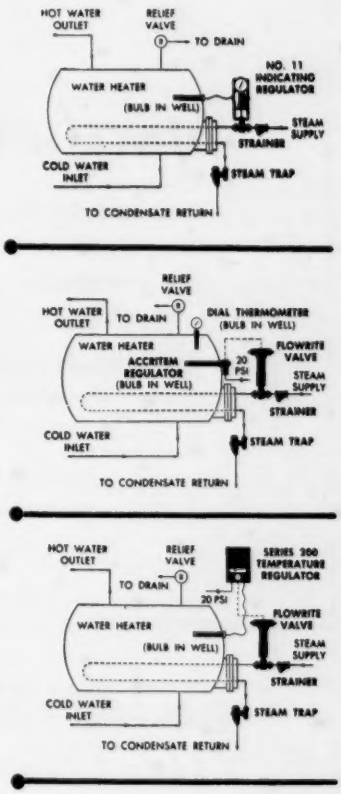
Oct. 9-12: ASME Rubber and Plastics Conference; Lawrence Hotel, Erie, Penna.

Oct. 17-19: ASME-ASLE Lubrication Conference; Statler Hilton, Boston, Mass.

Oct. 24-25: ASME-AIEE Fuels Conference; Daniel Boone, Charleston, W. Va.

Nov. 14-16: Mid-America Electronic Convention; Kansas City, Missouri.

Practical Ways To Control Hot Water Storage Heaters



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These diagrams, plus clear and concise information on storage heater control, are available to you without obligation as part of the Powers *Engineer's Manual, Steam-Water Service.*

This manual has been specially prepared for plant use. It is available free to personnel whose job function covers operation and/or installation of steam-water service. Various control systems described and illustrated include: domestic hot water . . . instantaneous heat exchangers . . . heat exchangers for cooling . . . fuel oil heaters . . . pressure reducing . . . jacket water cooling . . . two-temperature hot water systems.

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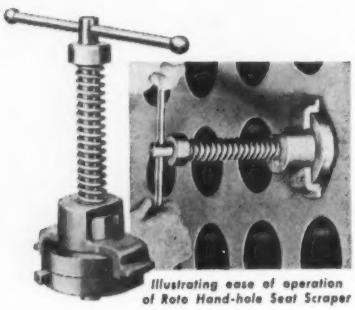
Hand-hole Seat Scraper



Illustrating ease of operation of Roto Hand-hole Seat Scraper

Eliminates tedious labor
Assures clean, tight fit

Roto Hand-hole Seat Scraper makes short work of cleaning dirty hand-hole seats. This simple, hand-operated tool has adjustable, spring-mounted retractable knives. A few turns to the right remove foreign matter without cutting the metal. A half turn to the left releases the tool, and the job is done. Customers say that the Roto Seat Scraper does the job up to 12 times faster than by any other method. Try one and you'll wonder how you ever got along without it.

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for most hand-hole shapes and sizes

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Babcock & Wilcox = 4	Round
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" " = 70	Round
" " = 48	Oval
" " = 40	Oval
" " = 24	Oval
	Oblong
Brox	Round
Casey Hedges	Oval
"	Oval
Combustion Eng'g	Round
"	Oval
Edgemoor	Oval
Erie City	Ellip
"	Oblong
"	Ellip
	Pear
Foster Wheeler	Oblong
"	Oblong
"	Ellip
Gentry	Oblong

Type of Boiler	Opening
Heine	Round
"	Oval
International Boiler 2	Oblong
Keeler	Round
"	Round
"	Diamond
"	Diamond
Lasker	Oblong
Murray	Oval
"	Oblong
Oil City	Oval
"	Oblong
Riley Stoker	Ellip
Springfield	Ellip
Union Iron Works	Pear
Henry Vogt	Ellip
"	Oval
Walsh & Weidner	Oval
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"	Ellip
"	Pear
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Specifically speaking

There are many industries who are dependent upon the need for large quantities of high-quality water for their processes — chemical food, pulp and paper just to name a few. How to get it though can present quite a problem. Years of experience, however, has shown Eastman Kodak the way. This company needs very pure water for film processing. It even has to be rid of all radioactivity. You'll be interested in how Eastman produces 30 million gallons a day of this high-quality water. The company's water works operation is described by A. C. Bailey, Head of that department.

Even after a product is manufactured, great care must be taken to see that it maintains its quality. Such is the case with wood products, which are susceptible to checking and dimensional changes when stored in places where the humidity gets too low. The savings that were realized in the first year more than paid off a simple humidification system that Heywood-Wakefield installed to protect the quality of its fabricated products. The system is described in the story on page 13.

If your elbow insulation cracks and looks unsightly — resulting in thermal losses — then you'll be interested in a prefabricated aluminum elbow jacketing that is easy to install and that can be used over and over again. How refineries are realizing many savings with this product is told and illustrated in the story beginning on page 14.

George V. Michael

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Plant and Power Services Engineer

Serves the professional, technical and practical interests of the engineers who design, install, maintain and/or operate the plant engineering services and the power engineering services.

IN THIS ISSUE

6 A wealth of information on centrifugal pumps
13 Will controlled humidity mean savings to you?
14 Are you plagued with elbow insulation crack?
16 How Eastman Kodak gets 30 mgd high-quality water
20 Compact circuit breakers spark new building's electrical service
22 Air-driven pump delivers 12,000 psi for hydrostatic testing
24 Bothered by bubbles? You can detect them
28 Here's a way to test pressure gages
33 Nomograph determines stoker speed
38 Over 70 catalogs for your library

PLUS lots of other news for plant and power services engineers

MONTHLY FEATURES

3 CONVENTIONS AND EXHIBITS
6 REPORTS IN BRIEF
20 NEW SOLUTIONS
24 NEW DEVELOPMENTS
29 NEW LITERATURE
33 ENGINEERING DATA
36 PHOTO NEWS
38 FOR YOUR CATALOG FILE

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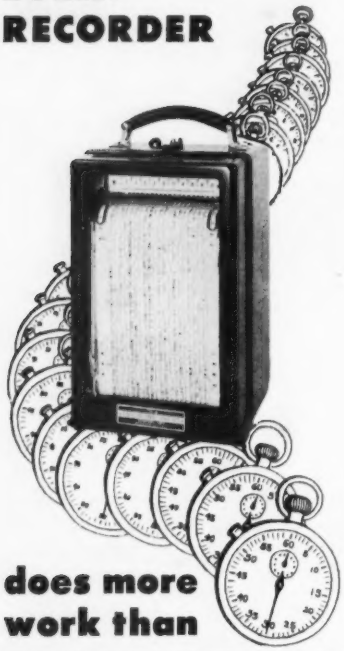

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Circle 9499 opposite back cover.

REPORTS IN BRIEF

Abstracted news of interest to plant and power services engineers

Sparking characteristics of metals studied

The results of tests, conducted by the Brooklyn Navy Yard, on the sparking characteristics of various metals, are available in a report released by the Department of Commerce.

The report concludes that:

"Metals, used in hand tools or other devices, that are safe to handle in an explosive atmosphere of gasoline vapor include manganese bronze, phosphorus bronze, aluminum bronze, commercial brass, aluminum and beryllium copper.

"Metals, used in hand tools or other devices, that are unsafe to handle in an explosive atmosphere of gasoline vapor include carbon steel, carbon tool steel, high speed tool steel, stainless steel and monel (nickel copper)."

Copies of the report: "Research and Development Report on Sparking Characteristics of Metals" (PB-151650) are available for 50 cents each from the U.S. Department of Commerce, Office of Technical Services, Washington 25, D.C.

Foresees nuclear energy for process and space heating

Manufacturers of modern boiler equipment serving industrial, commercial and institutional facilities for space and process heating are also looking ahead to nuclear atomic energy sources, says Russell E. Emrich, Sr., president and general manager of Boiler Engineering & Supply Co., Inc.

Mr. Emrich feels that consideration of atomic energy as a boiler heat source now furnished by conventional fuels is not as visionary as it might seem. The custom-built atomic energy power plants of today all have central-station type heat exchange equipment designed by boiler manufacturers. Advances in miniaturization will bring the atomic-fired boiler to the smaller industrial, commercial and institutional market sooner than most of us realize, says Mr. Emrich. (See also Mr. Paul Geiringer's story in the March issue of P&PSE.

"Boiler manufacturers are interested in three distinct avenues of approach to the use of atomic energy," Mr. Emrich observed. "The first possibility is a vessel not unlike a present-day boiler in which the burner and furnace is replaced by a battery-like atomic charge. Because of the more highly developed central-station technology of atomic power generation, a second means of atomic energy utilization might be through replacing the burner and furnace of process and comfort heating boilers by some sort of electrical element in an electric boiler design. A third possibility is that heat from central atomic plants might be distributed much in the form of central district heating and some sort of liquid-to-water heat exchanger will become the boiler of the future."

A wealth of information on centrifugal pumps

Containing over 50 illustrations, charts and tables in its 227 pages, "Centrifugal Pump Application Manual" has been designed to "acquaint users of pumps with the general forms and types of centrifugal pumping equipment and to aid them in understanding pump operation and intelligent pump selection."

The manual, written by engineers of Buffalo Pumps Division of Buffalo Forge Company, starts out with the basic principles of centrifugal pump operation and then goes on to discuss the many factors involved in handling the broad range of liquids used by industry today. Viscosity effects, cavitation and suction lift, temperature rise in pumps, packing and seals, installation and trouble-shooting are other subjects discussed and illustrated.

Reprints of the Centrifugal Pump and Data Sections of the Standards of the Hydraulic Institute are also presented.

Price of the manual is $5.00 per copy. More information on this manual can be obtained from Buffalo Pumps Division of Buffalo Forge Company, Department P&-PSE, 490 Broadway, Buffalo, N.Y.

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For more information, circle 9500 opposite back cover.

WILL YOUR "GROUNDS" CARRY IT?

During seasons of electrical storms, a careful program of checking all ground connections may save your company serious outages and property damage. Nine tenths of industrial lightning damage is reported to be on vital electrical equipment—motors, generators, transformers. Experience shows that ground resistance does not remain constant. Tests should be made at least once a year, and high ground resistance corrected.

Do You Have This Information File on Grounding?

The James G. Biddle Co. File 25 is an excellent fund of information on grounding problems. It includes a Manual on Ground Resistance Testing, and Bulletins on "Grounding Electric Circuits Effectively" and "Grounding Principles and Practices Applied to Industrial Plants."

USE THE MEGGER® GROUND TESTER

To test ground connections, the easiest, quickest, and most dependable method is the use of the Megger Ground Tester with its own hand generator for current supply. Reading the resistance value is as easy as reading a voltmeter—directly in ohms. Only *one set of connections, one operation, without any calculations.* Each instrument is self-contained, rugged, and portable. Its cost is a small fraction of the savings resulting from adequate grounding protection.

Write for Ground Testing File 25-PI.

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For more information, circle 9501 opposite back cover.

Demand for engineering graduates still exceeds supply

An optimistic outlook for business conditions in 1960 has resulted in an increased demand for college-trained engineers at higher salaries, with fewer prospective graduates available, reports J. A. Bornemann, Columbia University director of placement.

"In engineering and pure science," Mr. Bornemann said, "demand will continue unabated for electrical and mechanical engineers, mathematicians and physicists. It appears also that we will see increased interest on the part of industry in chemical and industrial engineers after a slight drop last year."

At Columbia, 200 companies are seeking mechanical and electrical engineers. Only twenty mechanical and forty electrical engineers are scheduled to receive their BS degrees next June.

Combine steam and gas turbines in generating cycle

A generating cycle combining a steam turbine and a gas turbine, to be installed in an Ohio power plant, will be used for the first time in the production of electric energy by a coal-burning plant.

A 5000-kw prototype turbine, driven by coal gas will be installed at the Muskingum River Plant of the Ohio Power Company at Beverly, Ohio. The gas turbine will be built adjacent to, and will operate in a combined cycle with, one of the plant's existing 215,000-kw steam turbines. It is expected that the gas turbine will be completed and in operation by the spring of 1961.

The gas turbine unit not only will generate an additional block of 5000-kw on its own, but it will also supply combustible byproducts to the steam boiler. Coal for the gas turbine, broken down by the high temperature in a carbonizer, will yield both gas and char. The gas will be burned in the gas turbine.

The hot exhaust from the gas turbine will join the other in a cyclone-type burner firing into the pulverized coal-fired boiler. The char will burn and supply a portion of the steam generated for the steam turbine.

foster and Power Engineers

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mastics	60-25/26	C. I. MASTICS	Asphalt vapor-barrier weathercoats	M-2-B
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	90-07	H. I. MASTIC	Fibrated asphalt "breather" weathercoating	M-2-B
	60-99	HiLASTIC	Flexible asphalt weathercoat of HiLastic system	M-3-D
adhesives	*81-42W	LAGFAS	Economical adhesive for lagging canvas on piping	A-2-A
flashings	30-46	INSULATION SEALER	Flexible sealer for flashing insulation	F-2-A
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For copies of those that meet your current needs, simply note the numbers on this coupon and mail.

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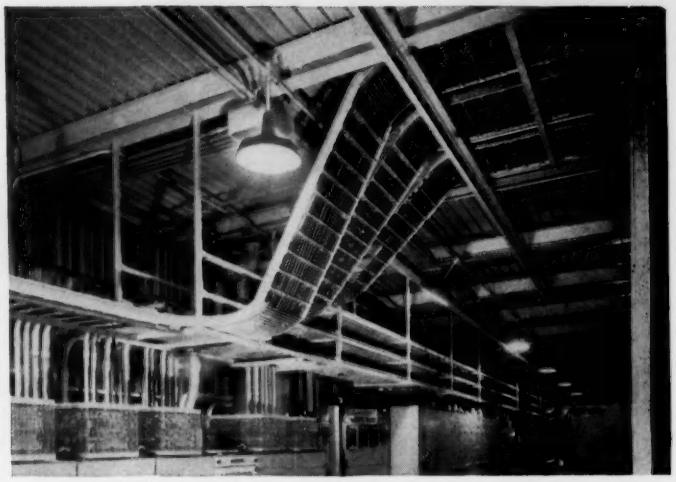
to support cables in their Indiana Harbor Plant



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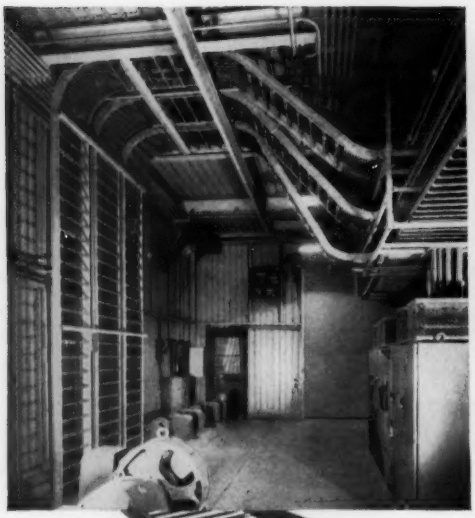

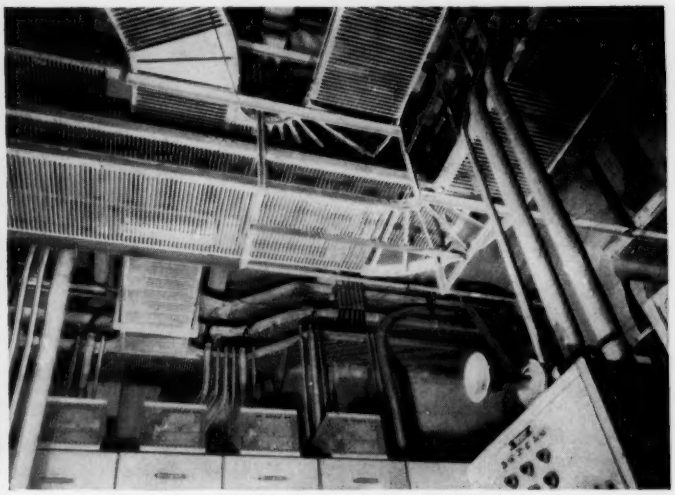

Globe's two types of cable trays, one a ladder type and the other a basket type, to support cables, wiring and tubing have become increasingly popular because they can be used INTERCHANGEABLY at any given location depending on the type and weight of the cables to be suspended. The advantages of each type tray can be used to the fullest. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is used for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants and for power distribution in all types of manufacturing processes. Send for FREE catalog giving full information and installation techniques.

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Representatives in all principal cities . . . consult the yellow pages in your phone book under "Conduits" for the one nearest you.

For more information, circle 9502 opposite back cover.

Program forecasts long-range needs

Powercasting—a new program to help utility management accurately forecast their long-range system needs—has been announced by Westinghouse Electric Corp.

The program makes use of mathematical models that duplicate all or any portion of the utility system. All system variables; technical, financial, and human—both predictable and random—are taken into account.

Use of operational gaming methods—a combination of system analogues, Monte Carlo techniques and human competition—can provide solutions to problems with so many variables that they can't be described by specific formulas or probability equations.

Absorption machines have lower operating costs larger capacities

A wider selection of heat-operated absorption refrigerating machines, manufactured by Carrier Corp., features a new control system that reduces operating costs. Models will be produced in 20 sizes ranging in capacity from 50 to 1000 tons.

The solution valve control system is said to offer a substantial saving through lower steam consumption when operating at partial capacity. It controls the cooling process by efficiently reconcentrating only enough salt solution to match the refrigeration load, electronically by-passing the rest. Because of this new method of handling the absorbent solution, the machine can return from low to full capacity much more rapidly.

In addition to providing minimum steam consumption at partial loads down to zero output, the control reduces the temperature of condenser water leaving the machine and thus sharply decreases scaling. Less scaling means longer life, reduced water treatment requirements and fewer shut-downs.

Steam at twelve pounds pressure or less is used for the machine's full operating range. Since pressure remains constant, there is no chance of corrosion due to introduction of air into the steam condensate system under partial load.

Circle 9503 opposite back cover.

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what you get in B&O Bituminous!

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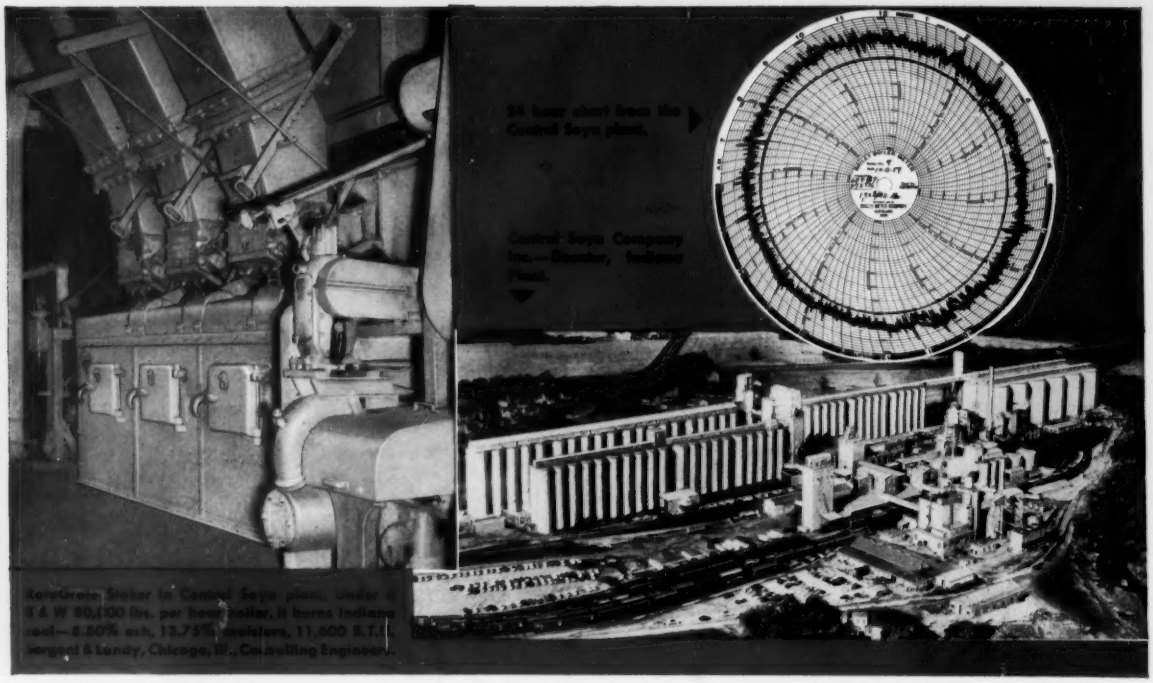


8 Years of Stoker Operation
Without Forced Outage

DETROIT ROTOGRATE AVAILABILITY AT CENTRAL SOYA COMPANY INC.

Hersel Nash, Steam Power Superintendent of Central Soya Company, Inc., Decatur, Indiana Plant says: "Our 80,000 pounds per hour, 600 psig boiler with Detroit RotoGrate Stoker has carried loads similar to the accompanying chart for 355 days per year for eight years (we have the boiler down for inspection and cleaning once each year, for about 10 days.)"

"During this time we have burned about 300,000 tons of Indiana coal without ever losing the load because of the stoker. Our monthly efficiencies average 85% to 86%. This is above the manufacturer's predicted performance."

This 'round the clock—seven days a week operation year in and year out with high economy proves the rugged stamina and ability of the RotoGrate . . . shows why it has long been first choice among operators and top management alike.

Built to serve steam generators up to approximately 400,000 pounds steam per hour capacity, the RotoGrate is one in a complete line of Detroit Stokers . . . overthrow spreader and underfeed types for commercial, industrial and utility boiler plants—also for incineration of both municipal and industrial wastes.

DETROIT STOKERS COST LESS Cost equals initial investment plus upkeep, plus production losses due to equipment outage. *The total is less with Detroit.* Ask for Bulletin.

DETROIT SINCE 1898 STOKERS

DETROIT STOKER COMPANY
DIVISION OF UNITED INDUSTRIAL CORPORATION
MAIN OFFICE AND WORKS • MONROE, MICHIGAN
District Offices or Representatives in Principal Cities

For more information, circle 9505 opposite back cover.

JUNE, 1960

VOL. 2 NO. 6

Plant-Power Services Engineer

Will controlled humidity mean savings to you?

If so, then you'll be interested in the system that Heywood-Wakefield Co. installed in its Gardner, Mass., plant. Consisting of 116 steam humidifiers, the system paid for itself in the first season of operation

It's normal for humans to complain about the humidity—especially if it's high—but some of Mother Nature's other "children" need moisture in the air in order to live right. Such a "child" is wood, and when dry air causes it to act up, the only thing you can do is pamper it.

How to do it economically, though, was a problem that faced engineers at Heywood-Wakefield Co.'s plant in Gardner, Mass. The New England winters can get pretty dry, particularly indoors, and this was causing high stock losses due to checking and dimensional changes. Since the company won't ship imperfect pieces, rejects and repairs mounted in the winter months.

For many years, the cost of purchasing and installing a humidifying system appeared to be prohibitive. To get around the problem, a variety of make-shift arrangements were tried. These included wetting down the floors, water spray rings on down blast unit heaters, and the use of end sealers on stock to slow down moisture loss. The results were unsatisfactory.

In the spring of 1957, a quotation was made on a system that was so much less than previous estimates that management became very interested. However, because the quote was so low, they were also suspicious. So they asked for and received in writing a guarantee that the humidifiers would perform as promised, or their cost would be refunded. On this basis, Heywood-Wakefield was gambling only on the installation cost.

The installation, consisting of 116 steam humidifiers, manufactured by Armstrong Machine Works, was completed in time for the 1957-58 heating season, and the economic benefits were soon apparent. Wood going down the hog, because of checks, was reduced over 75%. Daily spoilage of glued-up panels was reduced from between 30 and 35% to about 10%, none of which could be traced to dry air.

Rejects and repairs for all purposes were reduced by 50% or more. Savings in the cabinet department alone amounted to $1000 per week during several of the coldest weeks. All in all, the savings were so great that the system paid for itself in this first season of operation.

These electrically operated humidifiers operate very simply. When the relative humidity drops slightly below the desired level, a solenoid valve—actuated by the humidistat—admits steam to the separating-silencing chamber. Steam passes from this chamber directly to the atmosphere. A fan helps to disperse the steam. When relative humidity reaches desired level, the humidistat closes the solenoid and stops the fan.

A steam trap drains any condensate which forms in the body of the humidifier. The hot steam surrounding the chamber evaporates any condensate that might enter it, assuring that only dry steam enters the room's atmosphere. If you would like more information about these humidifiers, circle 9506 opposite back cover.

One hundred sixteen of these steam humidifiers make sure that wood stock won't lose any excessive moisture during the dry New England winter months

Are you plagued with elbow insulation CRACK?

Because of pipe expansion, cracks will almost always occur between ell and adjacent pipe insulation. These cracks reduce thermal efficiency and allow moisture to get in and damage insulation. You can save lots of time, labor and worry with a reusable aluminum elbow jacketing, whose ease of application is demonstrated in this story.

GEORGE V. MICHAEL
Editor
with **JOSEPH HATFIELD**
Insulation Foreman
Phillips Petroleum
Kansas City Refinery

UNDER standard methods of insulating weld ells, joint cracks (between the adjacent pipe insulation and the ell insulation) almost invariably occur because of pipe expansion.

Not only is this unsightly, but, since the crack is open to the atmosphere, moisture gets in. It is well established that moisture is the worst deterent to thermal efficiency, as it will subject the insulation to rapid deterioration. Getting wet is the rule rather than the exception with insulation.

If your plant has been bothered by this problem, then you'll be interested in hearing about a very fast method oil refineries are using to solve "ell joint cracks" problem.

Such a refinery is the Kansas City plant of Phillips Petroleum Company, which was one of the first to use "Humped Aluminum Elbows" to cover ell joint cracks.

These elbows, manufactured by General Aluminum Supply Co., come in two pieces which fit over and around the ell. They are held in place by metal bands or screws to protect permanently the ell's insulation.

With this design, all the insulator has to do is use the two halves as a "mold" — partially packing them with insulating or mastic cement — and strap them around the ell. In less than five minutes time, he has an insulated elbow, aluminum jacketed. (The method is illustrated in accompanying photographs taken at the Phillips plant.)

Or, the aluminum elbow can be used over prefabricated insulation, mitred segments, or glass insulation. Regardless of insulation used, the insulated ells are permanently covered and protected — and without breaking the "installation pace." This pace is broken when standard methods (insulating, tying, applying several coats of cement, etc.) are used on elbows.

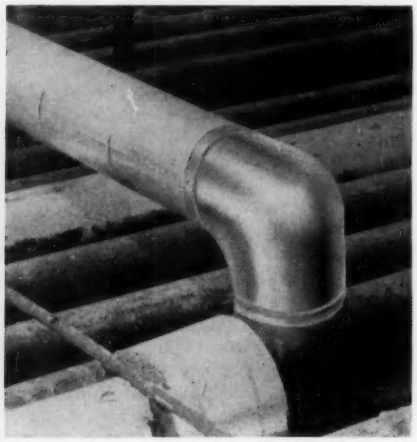
Use of these elbow covers is dramatized even more vividly when work has to be done up high. Scaffolding time requirements are shaved, since insulating the ells is completed at the same time as the rest of the line's insulation and jacketing — no waiting for cements to dry on elbows.

If ell inspection is necessary for pits, leaks, etc., the elbow covers can be quickly removed and replaced without damage. Because of the "interchangeable" feature, they can be used on other size pipes and insulation thicknesses — thus a plant needs never throw away a cover, as it can be used again and again.

In addition, the elbow covers give the plant a neat, trim, finished appearance. Since their design calls for smooth surfaces, there are no metal folds to collect dust or dirt.

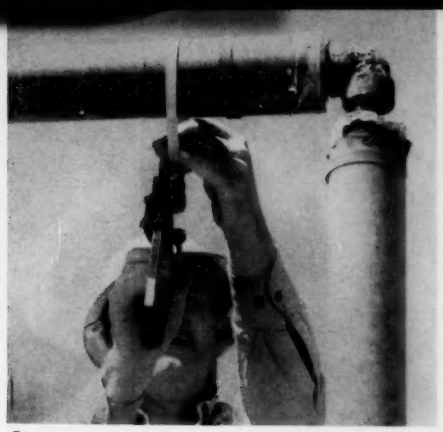
With only 13 interchangeable sizes, these humped elbows fit 109 combinations of varying pipe sizes and insulation thicknesses ranging from 3" OD through 12.81" OD. It is the "exclusive" hump feature that makes interchangeability possible. This design permits it to fit per-

Do your insulated ells look like this?



Would you like them to look like this?

Humped aluminum elbows not only give pipelines a trim appearance but can be installed faster and easier, save wear and tear on insulation, and be used over and over again



A

B

How to insulate and jacket an ell in less than 5 minutes time

A Removing cracked and broken insulation from pipe elbow, insulator prepares a metal band that will be used to clamp the humped aluminum elbow halves together

B The two halves are used as a "mold" partially packed with asbestos insulating cement

C Elbow halves are applied. Note how they fit snugly over straight run of insulated pipe and how "hump" compensates for varying pipe sizes and insulation thicknesses

D Pipe is insulated at same time it is covered. As bands are tightened, insulating cement inside is molded to fit pipe

E Ell is insulated and permanently protected from wear and tear.
Entire operation has taken less than 5 minutes, involving no cutting or fitting, coatings or clean-up

C

D

E

fectly on either a long or short radius ell.

They are constructed of heavy-gauge (.025-.032) aluminum, and will withstand lots of abuse from weather, water and mechanical sources. For more information on these "Humped Elbows", circle 9507 on Reader Service Card.

GOULDS

Can You Use 30 MGD of High-Quality Water?

— then read how Eastman Kodak's Lake Water Works Division supplies the huge Kodak Park complex — where water of unusual purity is the primary plant resource

ALLEN C. BAILEY
Department Head, Lake Water Dept.
Utilities Div., Kodak Park Works
Eastman Kodak Co.

Water, in million gallon lots, has been the most important basic manufacturing ingredient at the Kodak Park Works, in Rochester, New York, for almost seventy years. A wide variety of products, ranging from gelatine and photographic paper to light-sensitive emulsions, require large quantities of unusually high quality water in their production at Kodak Park.

The responsibility for pumping up to thirty million gallons of purified water each day into the world's largest photographic plant rests with the Lake Water Department of the Utilities Division. Located on the south shore of Lake Ontario, this modern treatment and pumping station, established in 1918, is the outgrowth of a search for water which pre-dates the Kodak Park itself.

Although the pumping station is situated on the lake shore, the first intake crib was placed 7,800 feet out in Lake Ontario in an effort to obtain clearer water. Located on the lake bottom in 55 feet of water, the crib was connected to the pumping station by a 42-inch steel pipeline having a 25 million gallon per day (mgd) capacity.

A six mile long 24-inch main with a capacity of 12 mgd was laid between the pumping station and Kodak Park. At Kodak Park a 4.5 mg reservoir was built to store the incoming lake water. This reserve met the company's needs until 1957 when the construction of a second 5 mg underground reservoir in Kodak Park West raised total storage capacity to 9.5 mg.

To improve the quality of the water, eight fine sand filters of the Blaisdell type were installed at the Lake Water Works in 1921. Total capacity of the filter plant was estimated at 12 mgd in summer, and 8 mgd in winter. The system was able to remove at least 90 percent of the turbidity or suspended dirt in the incoming Lake water. As production requirements for water at the Park continued to rise, additional slow sand filters were added until in 1941, a total cold water capacity of 18 mgd was reached. A second six-mile main with a 30-inch diameter was laid in 1930, bringing total pipeline capacity to 32 mgd.

Shortly after World War II the company was forced by production requirements to expand the raw water intake capacity of the water works. As the first step, a detailed operations research study was undertaken to determine the company's future water requirements. Factors such as sales trends, population growth, and production rates were projected, mathematical models were set up and analyzed, and the required diameter of the proposed intake was finally calculated.

On the basis of this study, a 54-inch concrete intake main was installed about 1.5 miles out into Lake Ontario, terminating in an intake crib on the bottom. On shore, a cylindrical concrete well 30 feet in diameter and 40 feet deep was "erected" in three sections above ground. As each section was completed, the entire structure was sunk to ground level.

This intake system, completed in 1947, has a capacity of 75 mgd, of which Kodak uses less than one half. The City of Rochester is temporarily drawing up to 36 mgd from this well for use at its filter plant.

Eastman Kodak was slow to adopt chemical pre-treatment and rapid sand filter methods due to a justifiable reluctance on the part of the production departments to have chemical agents added to the water supply. These departments were well aware that the manufacturing processes associated with the preparation of photographic products must be held in careful balance.

During the early post-war period, however, an exhaustive testing program was undertaken by all manufacturing departments, and, as a result of this careful study, in 1948 the first 6 mgd chemical pre-treatment and rapid sand filtration system was

to next page

◀ **Five high-lift pumps** with a capacity of over 30 mgd transfer water from Lake Water Works through 6 miles long conduits to Kodak Park

Three large surge suppressors, manufactured by Pelton Div., Baldwin-Lima-Hamilton Corp., activate automatically in the event of a power failure to eliminate the hazards of "water hammer"

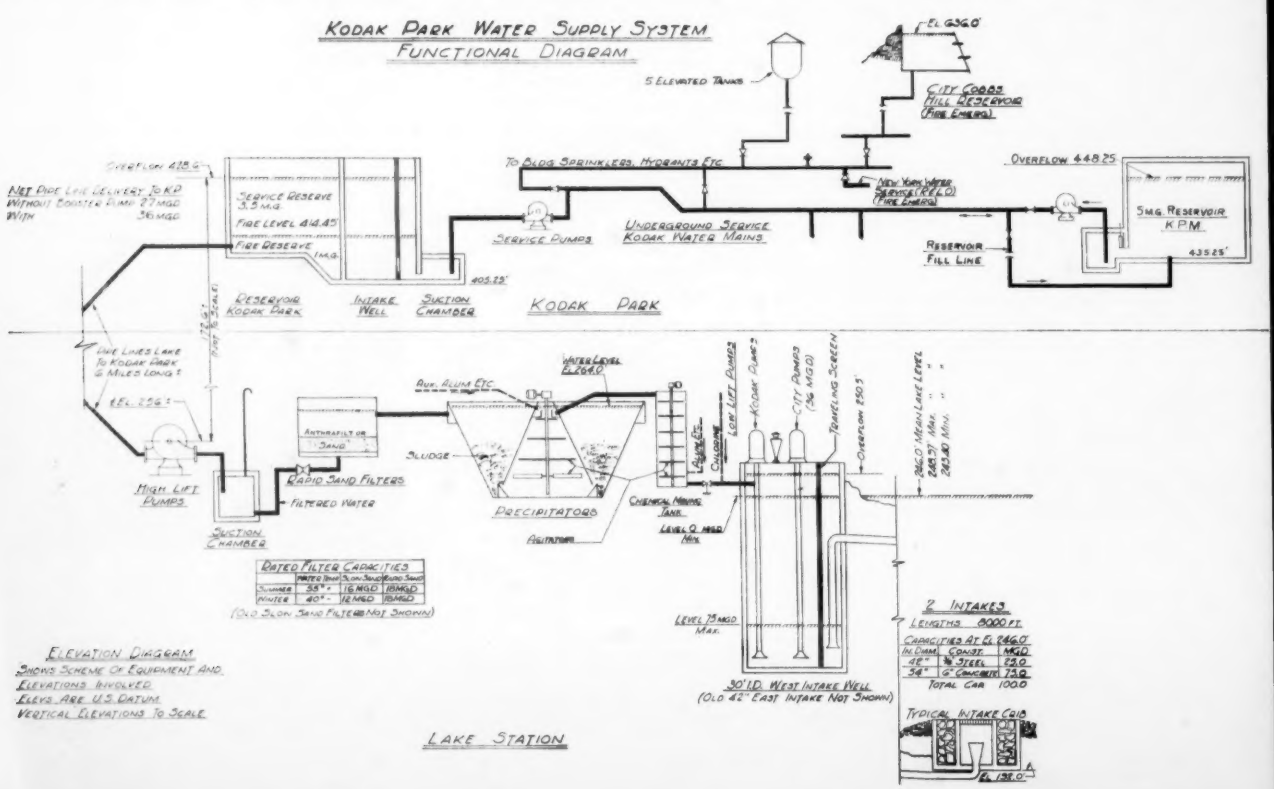
Chemical treatment of raw Lake Ontario water takes place in three Pfaudler-Permutit precipitators and a mix tank near the lake shore. An additional precipitator and mix tank are under construction in an adjacent area

placed in operation. The new plant has proved capable of supplying much better water at about ten times the rate of the slow sand system.

The present installation consists of a chemical mixing tank, three chemical treatment tanks, and a series of eighteen "rapid sand" filters. A second chemical mixing tank and chemical treatment tank currently under construction, with six rapid sand filters, will boost capacity to 23 mgd.

The shift to chemical treatment was extremely timely, for in 1950, radioactive fallout was first detected. Analysis revealed that rapid sand filtration removed virtually all contaminated particles, while the old system was somewhat less effective. Upon completion of the new construction, over 90 percent of Kodak Park's water will be processed through the rapid-sand filtration system.

In 1951, the manufacturing departments authorized the installation of a chlorination system at the Lake Water Works. Sterilization kills micro-organisms which tend to



form growths in piping, developing tanks, and other equipment. Rate of chlorination is adjusted automatically according to the amount of free chlorine residual in the purified water arriving at the Park.

Water tends to corrode the interior of a cast iron or steel pipeline and the friction caused by the roughened surface can seriously reduce capacity. To eliminate this problem, the 30-inch main from Lake Ontario to the Park was thoroughly cleaned in 1956 and completely cement-lined. The resulting capacity increase amounted to more than four mgd.

The accompanying diagram shows schematically the components of the present Kodak Park water system.

Raw water enters the intake crib 55 feet below the surface of Lake Ontario at a point about a mile and a half from shore and flows into the cylindrical concrete intake well described earlier. Point of entry is about 15 feet below ground level and the intake elbows down to within five feet of the bottom. Drawing power of the intake can be substantially increased by maintaining the water level in the well below the elbow.

Two low-lift pumps with a combined capacity of 45 mgd raise the water from the well into the bottom of the chemical mixing tank where alum, clay and other chemicals are added automatically in carefully measured and timed quantities. Thorough mixing is accomplished by an agitator as the water flows up through the tank.

The chemically treated water then passes into the top of one of the precipitators. As it descends through the center column, gentle agitation causes the alum to form a floc which entraps suspended matter. The water then rises through the accumulated blanket of floc in the outer chamber of the precipitator and is drawn off into collecting troughs prior to entering the rapid sand filters. An electric-eye insures that the sludge which accumulates at the bottom of the precipitator is drained off periodically.

The filter units consist of 25 inches of anthrafilt laid on a carborundum plate under-drain. Eighteen such beds, measuring 21 feet by 16.5 feet, have been installed to date. Each bed has a capacity of one mgd. Filters are cleaned every 36 hours by simply reversing the ordinary filtering process.

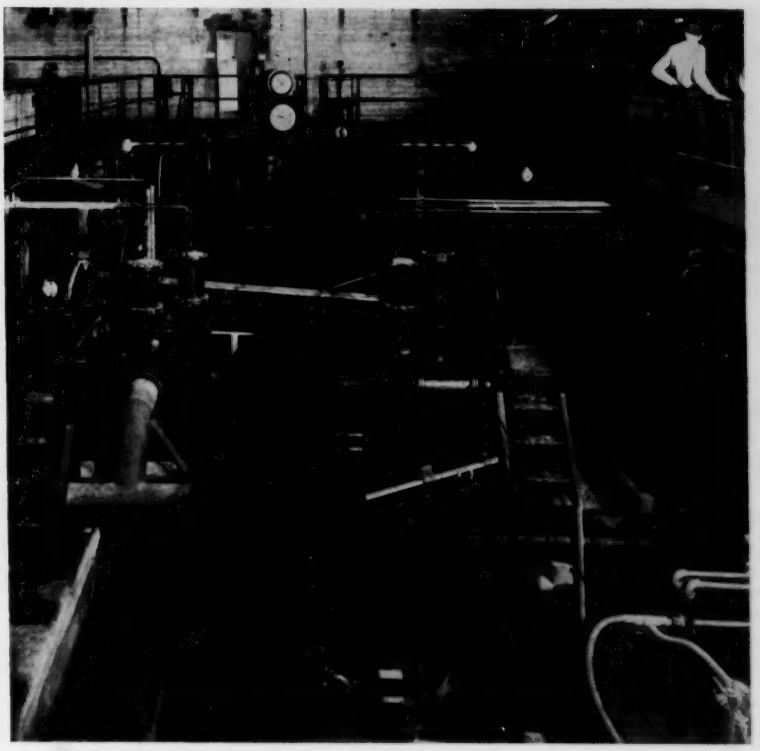
From the filters, the purified water enters a suction chamber prior to transfer by five high-lift pumps through the six-mile-long conduits to Kodak Park. The high-lift pumps raise the water almost 175 feet between the Lake Water Works and the Park. To prevent recurrence of backflow damage due to power failure, which occurred in 1918, three surge suppressors were installed to automatically divert the torrent into a nearby pond.

Purified water is stored in a 4.5 mg underground reservoir in Kodak Park East. A series of five pumps maintain required pressures in the various production areas, fire hydrants, and sprinkler systems. The firm operating capacity of the Kodak Park East pumping system is rated at 31.5 mgd, with the largest pumping unit held as a spare. A second underground reservoir in Kodak Park West stores an additional five mg of water.

The three largest users of water at the Park are the gelatine division, the paper mills, and the synthetic chemicals division. Several production departments add special agents to the water to meet unusual specifications. For example, the gelatine division adds lime, the steam power division softens the incoming water, and the film emulsion making division adds a hardening agent.

The company fire mains are connected to both the City of Rochester Cobb's Hill Reservoir and the Monroe County Water Authority system. When pressure in the Kodak Park fire system falls below a minimum predesignated level, gate valves open automatically allowing city water to supplement the company supply. These valves are "one-way," however, and at no time can Kodak Park water enter the public system.

Improvements at the Lake Water Works have by no means ceased. This year, rapid sand filters will replace several more of the slow-sand beds, and plans are under consideration for a new pipeline and additional cooling towers. In addition, new methods of chemical pretreatment are being tested which may further improve the quality of the water delivered to the Park. Judging from this expansion program, water will not soon be replaced as the number one resource at Kodak Park. ■



Eighteen rapid sand filter beds lie to the left and right of the central gallery at the purification plant

Compact installation of current-limiting circuit breakers is shown by the small size of three units used in the main lobby of the new Time & Life Building

How the new Time & Life Building gets maximum continuity of electrical service

80 compact circuit breakers confine faults to very small office areas

Unlike most large commercial buildings, the new Time & Life Building at Rockefeller Center will not have to worry about large areas going without electricity in the event of a major fault in any of the building's low-voltage circuits.

This unprecendented continuity of electrical service is provided by 80 compact current-limiting circuit breakers installed at each of the 80 bus taps in the 48-story building. The breaker will confine faults to the area serviced by a bus tap and, thus, prevent other areas from losing power.

The breakers, developed by I-T-E Circuit Breaker Company, are being used instead of such larger, heavier pieces of equipment such as switches and fuses that have been almost standard equipment up to now in buildings of this type.

The breakers are capable of clearing faults of up to 100,000 amps in a split second, before serious damage can occur to system components.

Low-voltage power for the entire building is supplied through seven bus duct runs, each of which carries 2500, 3000 or 4000 amps through the building from the basement substations. The "Cordon" breakers are attached by connecting straps directly to the bus duct at each point where current is tapped to supply an entire floor or part of a floor. One or more taps are used on each floor to supply power to the floor.

The current-limiting breakers, by providing protection against extremely high fault currents, place a protective shield between the distribution circuits on each floor and the substations. They are integrated combinations of molded-case breakers and special current-limiting fuses.

The breakers first provide protection against sustained overloads and low magnitude faults through conventional thermal and magnetic trips — protecting against the majority of circuit problems. In addition, however, heavy-fault interruption and current-limiting action are afforded by the special fuses. These are mounted in a removable housing which plugs into the load side of the breaker.

When a current-limiting fuse operates, a spring-loaded plunger is forced out. This plunger actuates a a common tripper bar so that all poles of the breaker open simultaneously, thus preventing a single-phase condition on a three-phase circuit.

The extended plunger also prevents resetting of the breaker, warning that a major fault has been interrupted and that the circuit should be investigated before replacing a fuse and re-energizing.

For more information on "Cordon" breakers, circle 9508 opposite back cover.

For more information on items reported in the New Solutions section, circle corresponding numbers on reader service card opposite back cover.

Solves heat, abrasion problems at world's biggest fluid coker

Fine particles and high temperatures proved too much for other valves

Excessive heat and abrasion created serious valve difficulties on a new dense-phase pneumatic conveying system for the world's largest fluid coker at Tidewater Oil's refinery. Daily, 1000 tons or more of fluid coke are conveyed from the huge coker to a power plant 1500 ft away through three 5-inch pipelines. Temperatures up to 1000°F and abrasion approaching that of diamond dust proved too tough for most valves to handle at start-up and during operation.

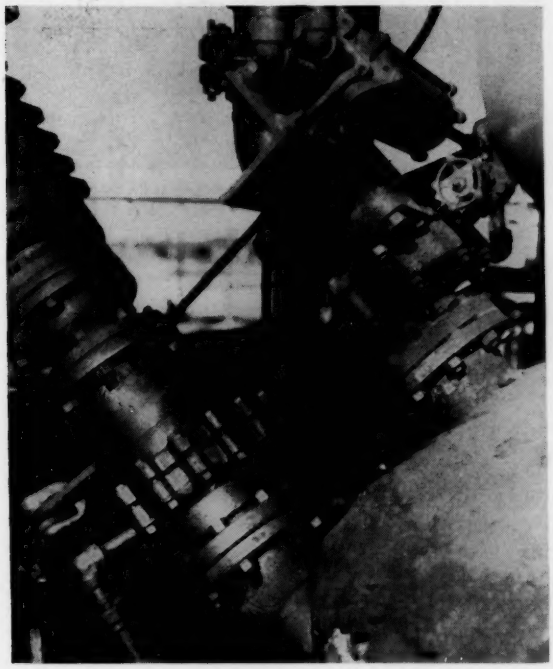
The problem was solved when the use of a quick-acting, non-wedging gate valve, manufactured by Everlasting Valve Co., was recommended.

Fluid coke is discharged through the valve to the pipelines when air pressure has built up to 40 psi in the activator. A vent valve exhausts pressure to the

atmosphere to facilitate reloading after discharge pressure drops below 18 psi.

Excessive temperatures at start-up caused a diaphragm-type valve to fail after the first few test cycles. The replacement — an air-cylinder-operated plug valve — was warped by the heat which also dried the lubricant.

By switching to the 4-inch cylinder-operated gate



Quick-acting, non-wedging gate valves overcame abrasion and high temperature problems on fluid coke conveying lines

valve, the problems were overcome, and the valve has been in continued service for two and one-half years. Because of this success on the vent line, a 6-inch valve was recommended for use on the discharge line also.

The valves' spring-loaded sealing disc slides over flat seat face. The self-lapping action wipes damaging coke particles to one side, preventing heavy wear of seat faces and maintaining a leak-tight seal.

For more information on these valves, circle 9509 opposite back cover.

Is your catalog file complete?

There are over 70 important catalogs described in the "Catalog" section starting on page 38 — catalogs which every plant and power services engineer should have in his files. To receive your personal copy of any of these catalogs, circle the corresponding Reader Service Number listed in the catalog section on the card opposite back cover.

THEY ARE MORE COMPACT

Small size simplifies storage and handling. Small size permits unobtrusive installation or concealment in public buildings. Small size permits "out of the way" mounting, to avoid physical damage, in industrial applications.

Advanced engineering created the louder, better sounding, more desirable, and better looking Vibratone. It will fit your signal requirements just as nicely as it fits in a 4" outlet box.

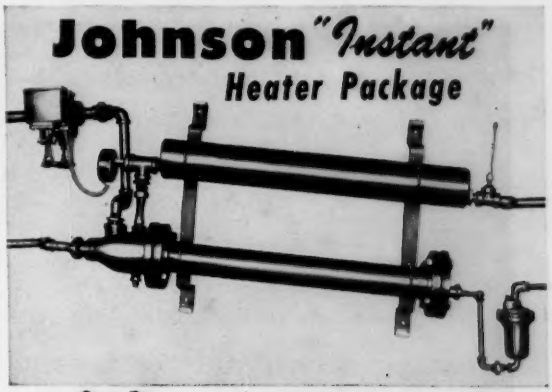
Specify Federal Vibratones for your signal installations. Investigate. Ask for Bulletin #105.

FEDERAL SIGN and SIGNAL Corporation

13609 S. Western Ave., Blue Island, Ill.

For more information, circle 9510 opposite back cover.

Johnson "Instant" Heater Package



Easy to install... just hang it on a wall

Here's a hot water source specially engineered for today's industrial plants. Hooks up to steam lines anywhere, produces hot water instantly on demand. No bulky, expensive storage tanks. No residual heat to cause scalding; holds maximum discharge temperature within 10° of setting. Johnson heater design achieves rapid, efficient heat transfer with only a few simple rugged parts — hooks right up to high pressure steam lines; no reducing valves needed. Capacities up to 900 gph. (for 100° rise) depending on steam supply pressure.

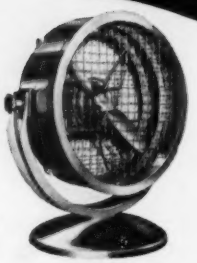
Write for full information

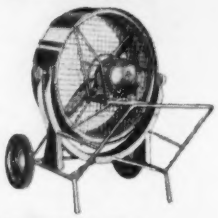
THE JOHNSON CORPORATION
807 Wood St., Three Rivers, Mich.

For more information, circle 9511 opposite back cover.

MOST VERSATILE UTILITY FAN

- compact, rugged, reliable
- set it on the floor, suspend it from wall or ceiling
- fan turns freely in a full circle, locks easily and positively in any position
- portable model in sizes from 20" to 36" — wheel model in sizes from 24" to 36"

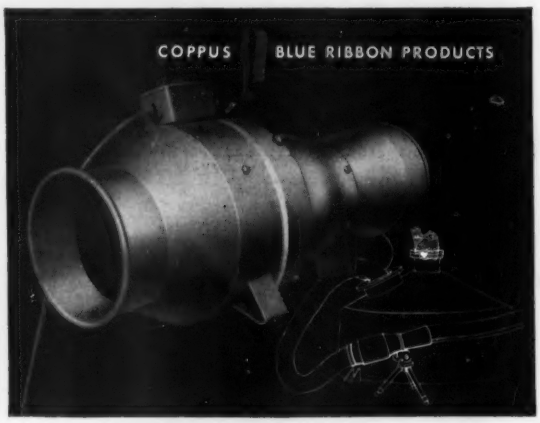




For details on this amazingly versatile man and materials cooling fan, write for your free copy of Bulletin A-109 or call your nearby Hartzell field office.

HARTZELL PROPELLER FAN CO.
Div. of Castle Hills Corp.
52 Thomas Blvd., Piqua, Ohio A member of AMCA

For more information, circle 9512 opposite back cover.



COPPUS "Blue Ribbon" Ventilator-Exhausters are portable and easily adaptable . . . for exhausting welding fumes or foul air from enclosed vessels. Mail coupon below for facts.

COPPUS ENGINEERING CORP.
186 Park Avenue, Worcester 10, Mass.

- ☐ in tanks, tank cars
- ☐ in underground manholes
- ☐ for exhausting welding fumes
- ☐ on boiler repair jobs
- ☐ for general man cooling
- ☐ to stir up stagnant air wherever men are working or material is drying

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Company.....
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COPPUS BLOWERS

For more information, circle 9513 opposite back cover.

A simple twist of a valve on this air-driven hydraulic pump supplies high hydraulic pressure for hydrostatic test and impregnation operations

Air-driven pump develops 12,000 psi for hydrostatic testing

Unit is operated by 90 psi plant air

Considerable time is being saved at Philadelphia Bronze and Brass Corp. with an air-driven hydraulic pump compared to a manual pump in making hydrostatic tests on non-ferrous castings. Up to 30 simple castings can be tested in an hour.

Developing the required hydraulic pressure takes only a twist of a valve instead of laborious hand pumping. The castings can be tested as fast as they can be clamped pressure tight. Unsound castings are detected swiftly by visible leakage or failure to hold pressure on a gage.

The need for high-pressure, production testing is due to the fact that over 50% of the firm's customers specify their castings be tested at pressures averaging between 2500 and 5000 psi.

To handle this large volume of tests, the firm incorporated the use of a double-acting air-driven hydraulic pump in its test facilities. The pump, made by Aldrich Pump Company, develops hydraulic pressure from 50 psi up to a maximum of 12,100 psi and is operated by 90 psi plant air. It is the sole source of hydraulic pressure.

It is also used for rupture-testing tube assemblies and supplying pressure to a large impregnation tank located nearby. Some customers specify that their castings be impregnated, and these are immersed in the tank, which contains powdered metal heated to 180°F. Pressure is then applied and built up in the tank to 400-500 psi to force the powdered metal into the casting bodies.

More information on this air-driven hydraulic pump may be obtained by circling 9514 opposite back cover.

Chicago's new Exposition Center saves with aluminum bus, conduit

Elaborate electrical system needed to display world's wonders

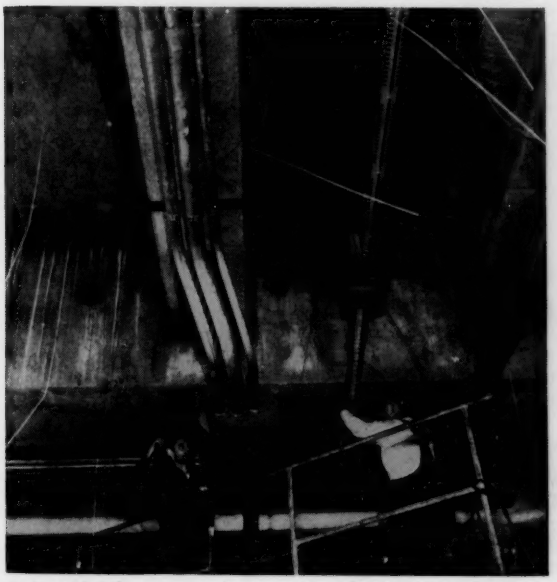
Chicago's mammoth Lakefront Exposition Center — scheduled to be completed next November — will sometimes have an electrical load to rival that of any industrial plant. At any of the expositions that will be held there, vast arrays of equipment will be in operation to display their abilities to visitors.

To handle this load, 8000 kva of power will be distributed via aluminum plug-in bus throughout six acres of a seven-foot-high utility gallery. At each of the supply "centers", aluminum conduit will carry conductors upward, through the exhibition floor, to provide power at 120/208, 277/480 and 480 volts to exhibitors through 300 floor-flush utility ports.

The use of aluminum conduit and bus duct, supplied by Alcoa, will permit a savings of over $20,000 in the cost of the Center's electrical system. This breaksdown to $9545 saving in conduit (1¼" and larger) costs as a result of reduced installation labor costs. A saving of $11,317 in material costs was realized by the application of aluminum bus duct. Both figures are based on comparisons of costs as originally estimated for bus and conduit made of other metals.

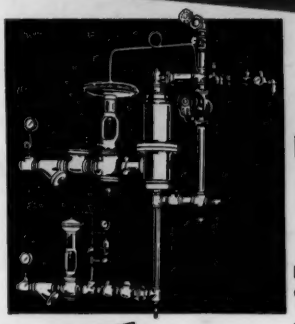
The Center has been described as the most advanced convention and exhibit facility ever designed. An intrinsic part of the over-all design is the utility supply to an exhibition floor longer than six football gridirons. Water, drainage, exhaust, gas, compressed air, steam and electricity are supplied to this vast area from a gallery beneath the main floor.

For more information on aluminum bus and conduit, circle 9515 opposite back cover.



Over $20,000 were saved when aluminum bus duct and conduit were substituted for those made of other metals

CUT HOT WATER COSTS



Pick STEAM INJECTION HOT WATER HEATERS

8 sizes . . . 500 to 50,000 Gals. Per Hour

Hot water in a flash — produced only as it's needed!

Pick patented mixing chamber is completely automatic . . . direct contact of steam and water provides desired hot water temperature *instantaneously* . . . temperature accurately maintained by thermostatic controls.

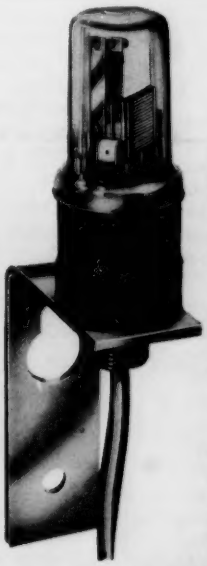
Water volume adjustable from 5% to full rated capacity of heater. 20-second reaction to desired up-and-down changes in water temperature.

Write today to Dept. Q

FREE BULLETIN Shows how Pick Heaters are used in many industries.

Pick WATER HEATERS

For more information, circle 9516 opposite back cover.



CUT YOUR LIGHTING COSTS TURN LIGHTS ON AT DUSK- OFF AT DAWN AUTOMATICALLY!

There are over 250,000 Precision Photo Controls regulating yard, platform & other outdoor lights, producing artificial light only when necessary.

PRECISION MULTIPLE CONTROLS., RIDGEWOOD, N. J.

For more information, circle 9517 opposite back cover.

NEW DEVELOPMENTS

Protects oil-fired boilers against slag, corrosion; is oil-soluble liquid

A combustion chemical designed to protect residual oil-fired boilers against slag and "cold-end" corrosion has been made commercially available.

The material is a clear, oil-soluble liquid, and field and laboratory tests have shown it to be particularly effective in protecting the air heater and economizer sections of residual oil-fired units. It is also effective in reducing fouling by slag throughout the furnace.

It protects boiler fireside surfaces by interrupting high temperature reactions that cause oil ash constituents to form slag. It poisons catalytic surfaces that promote sulfur trioxide formation.

(Nalco 159 is product of Nalco Chemical Company, 6216 West 66th Place, Chicago 38, Ill.)

Circle 9518 opposite back cover.

Encapsulation process protects motor windings against water, chemicals, dust

As a result of several years' experimentation with new insulating materials and vacuum molding processes, motor manufacturer has developed a special protection for windings functioning under adverse environmental conditions where conventional motor insulations have short life expectancy.

Molded in rigid high-grade epoxy resin, the encapsulated windings are fully protected against the attacks of excessive moisture, acids, alkali, abrasives, dusts and other contaminants.

In the process, the stator is enclosed in a mold and liquid epoxy resin is injected under vacuum so that there are no air pockets to retain heat and decrease protection. Each winding is permanently and individually sealed. Because of the high heat transference characteristic of the resin, open-type motors with this insulation still will have a service factor of 1.15.

Rigorous tests were made on prototypes of the present design. Encapsulated windings were exposed to radical temperature and humidity changes, being cycled from a hot and dry environment to a low temperature at 100% humidity and receiving both short and prolonged voltage surges. Years of duty were simulated by accelerated tests, and the results showed that this insulation would stand up much longer than standard insulation under severe operating conditions.

The new protection is available on all of this manufacturer's motors.

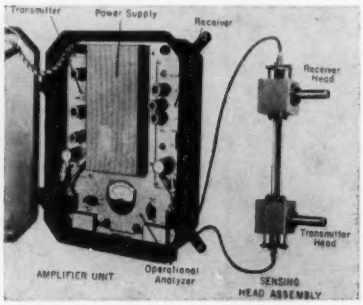
(More information on "Everseal" winding insulation can be obtained from U.S. Electrical Motors Inc., Box 2058, Terminal Annex, Los Angeles 54, Calif.)

Circle 9519 opposite back cover.

Do bubbles plague you? Here's an easy way to detect them

Ultrasonic device finds them in static or flowing fluids

Whether your concern is with bubbles in a liquid or the resultant surface foam, it makes no difference to this ultrasonic bubble detector which can find undesirable or controlled bubbling in almost any liquid — in open or closed vessels, pipes or flumes. The instrument's efficiency is not affected by whether the liquid is static or flowing.



Individual bubbles as well as large quantities may be detected in pipes and open or closed vessels

It can be coupled with any type of indicating, recording, controlling or alarming instrumentation. Individual bubbles are detected as readily as large quantities, and the strength of the output signal varies with both the size and number of bubbles.

Here is how it works: The sensing head assembly, located at the process, is cable-connected in a continuous loop with the amplifier unit, which may be remotely located. A pulsed ultrasonic signal passes through the liquid which is flowing between the transmitter and receiver heads. The presence of bubbles weakens or interrupts the signal.

No air supply is required. Power supply consists of rectifiers and regulators for excitation of the transmitter. An operational analyzer eliminates need for external calibration and test equipment.

Minimum bubble size which may be detected is 0.001" diameter. Maximum operating temperature and pressure for head assembly are 180°F and 100 psi respectively. Fluid viscosity range is 1 to 30,000 centipoise.

The instrument has proved valuable for detecting bubbles in film emulsions, lubricating oils, fuels and water. Some other applications could be the inspection for leaks in radiators or any closed vessels which could be tested by submersion in water and being filled with air.

(Ultrasonic bubble detector is product of Taylor Instrument Companies, 95 Ames St., Rochester 1, New York.)

Circle 9520 opposite back cover.

Here's a way to treat water; it uses electricity, to prevent scale formation

Uses small amount of electricity

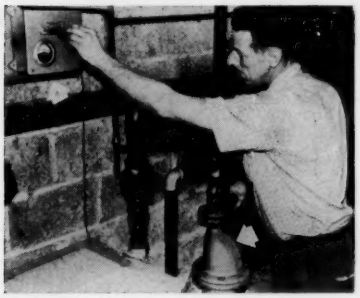
Based on a principle of physical, rather than chemical, effect on hard water salts while they are still in solution, simple, automatic device electrically pre-treats hard water. Because there are no moving parts to wear out, the device virtually requires no maintenance.

Only a current of a few milliamps is required. This may be supplied by connection to a standard AC source, or a battery-powered unit may be installed in remote locations. A conventional 1½-volt dry cell will last around 6 months.

Installation is as simple as put-

ting any fitting into a pipeline. The unit consists of an expanded pipe section containing an electrically insulated metal grid electrode, and a control box for adjusting the current to a predetermined ideal operating value. The pipe body is made of bronze casting, and the electrode is made of Monel.

It may be installed indoors or outdoors, horizontally or vertically. Units are furnished in all pipe sizes from ½″ to 8″, with capacities



Device is as easy to install as any fitting (arrow). Control box can be located anywhere

ranging from 100 to 40,000 gph. Larger units are available. All units are tested hydraulically to 250 psig.

The device does not remove any of the water impurities, nor does it soften water. What it does is prevent the formation of hard scales or deposits (calcium and magnesium salts).

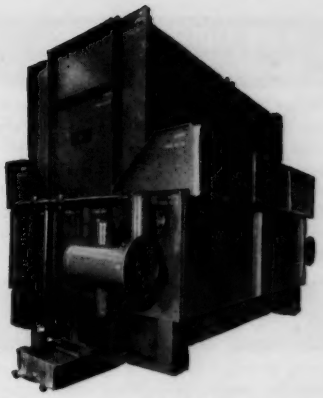
Over 10,000 of these units are in use around the world in heat exchangers, air conditioning and refrigeration systems, condensers and evaporators, water distribution systems, and hot water heaters among other applications.

(DSI scale inhibitor is product of Dehydrosal Systems, Incorporated, 521 Fifth Avenue, New York 17, New York)

Circle 9521 opposite back cover.

For more information on items reported in the New Developments section, circle corresponding numbers on reader service card opposite inside back cover.

ECONOMICAL COOLING OF GASES AND COMPRESSED AIR



Cooling gases or cooling and removing moisture from compressed air, the Niagara *Aero* After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

Cooling-water savings and power-cost savings in operation return your equipment costs in less than two years. New sectional design reduces the first cost, saves you much money in freight, installation labor and upkeep. Niagara *Aero* After Cooler systems have proven most successful in large plant power and process installations and in air and gas liquefaction applications.

Write for Descriptive Bulletin 130.

NIAGARA BLOWER COMPANY

Dept. PL-6, 405 Lexington Ave., New York 17, N. Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

For more information, circle 9522 opposite back cover.

Here's why you're money ahead

with A. O. Smith glass-protected smokestacks

- Now available in a variety of colors
- They last longer — as much as 3 to 5 times longer than unlined steel stacks — corrosion resistant regardless of excess condensate
- Glass is tough, durable — shows remarkable resistance to impact or abrasion
- Maintenance is low! There's no painting—glass can't rust
- Economical to install — no need for special equipment or highly skilled workmen

Write Dept. PPSE-60 for full facts.

Through research ... a better way

A.O.Smith

SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
P. O. Box 584
Milwaukee 1, Wisconsin

For more information, circle 9523 opposite back cover.

IN ION EXCHANGE COLUMNS AND DEMINERALIZERS

Neva-Clog permits more uniform distribution of regenerating liquors. Its smooth surface allows complete removal of resin in external regeneration systems. Neva-Clog eliminates the need for subfill and avoids its negative side effects such as caustic hideout, silica pick-up, excessive wash water and lengthy wash cycle.

AS SUPPORT FOR GRANULAR CARBON IN PROCESSING COLUMNS

Being stronger and more rigid than woven metallic media, Neva-Clog requires minimum undersupport. Handles all granular carbon. Ideal for flat and conical tower bottoms. Smooth surface facilitates carbon removal. No subfill required; no burlap bags; no gravel mixed with carbon.

IN PRESSURE LEAF FILTERS

Neva-Clog provides excellent precoat characteristics. Leaves do not have to be redressed. Easy to sluice, backwash, scrape.

IN FILTER PRESSES

Neva-Clog gives better drainage than the usual textile and backing screen combination, especially in high pressure filtration.

FOR CENTRIFUGE BASKETS

Neva-Clog's smooth, sheet metal surface permits closest ploughing.

FOR CONTROL OF FUMES AND DUST

Neva-Clog has high gas scrubbing efficiency, without fouling or becoming plugged.

NEVA-CLOG

A double layer, uniformly perforated, offset, double sheet metal medium that functions on the principle of edge filtration, as the magnified illustration shows. It is strong and rigid, yet can be formed into flat or curved panels, discs, plates, cylinders or cones. It has a smooth, non-porous surface; resists abrasion; does not clog, blind or corrode. Its advantages are many; its applications are constantly expanding.

Bulletin 582 tells why. Write.

MULTI-METAL WIRE CLOTH CO., INC.
1341 GARRISON AVENUE, NEW YORK 59, N. Y.

Circle 9524 opposite back cover.

For straight tube jobs in air conditioning, refrigeration applications

Designed expressly for refrigeration and air conditioning applications, a copper tube has been designed to handle straight length jobs. The cleaned and sealed tube is available in 20-ft lengths in sizes ranging from ¼ inch nominal OD to 4 inches inclusive, ready for use by the refrigeration service engineer.

Other features of this seamless tube include color coding with ACR markings.

Customers may combine orders for this tube with those for 50-ft coils of refrigeration service tube to obtain best quantity discount, as long as the total net weight involved is 2000 lb or over.

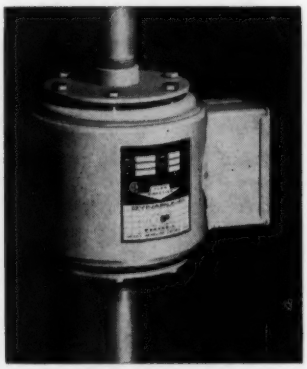
(ACR (Type L) tube is product of Wolverine Tube Division of Calumet & Hecla, Inc., 17200 Southfield Rd., Allen Park, Mich.)

Circle 9525 opposite back cover.

'Canned' pump requires no lubrication, is leak-proof

A compact, leak-proof pump for commercial and industrial use will handle up to 1500 gpm at heads up to 20 ft of water.

All wetted metal parts are stainless steel. Since rotor, shaft and impeller form a single assembly enclosed or "canned" in a stainless steel cylinder, there is no stuffing box or mechanical seal.



There is no stuffing box or mechanical seal; fluid acts as lubricant

The pumped fluid itself circulates in the rotor chamber and acts as bearing lubricant and motor coolant. No external lubrication is required.

The pump is suitable for pressures to 150 psi and temperatures to 220°F. It is available for operation on either 115 or 220v, single-phase, 50 or 60 cycles.

Automatic overload protection is provided.

(Dyna pump Model 670 E is manufactured by Fostoria Corporation, Dynapump Div., Dept. P&PSE, PO Box 35-5, Huntingdon Valley, Pa.)

Circle 9526 opposite back cover.

Pneumatic bunker cushion stops flow stoppages

Provides 100% safe mechanical control

Pneumatic bunker cushion is designed to eliminate flow stoppages in bins and hoppers handling materials which tend to funnel, bridge, cake and otherwise hang-up. When inflated with the recommended pressure of 45 psig. the cushion exerts a force of approximately 56,000 lbs., or more than five times that of any similar device. Its operation in no way jeopardizes personnel safety, and generates no damaging fatigue stresses.

Rubber shock cords connect membrane and exhaust valve, thereby providing 100% mechanical control. Deflation cannot occur until the cushion has reached its fullest height. Cords serve to actuate the exhaust valve and relieve shock load stresses caused by the sudden removal of opposing load or falling materials.

(Bunker cushion is development of Tressler Engineering Products Division, 17 Battery Place, New York 4, New York.)

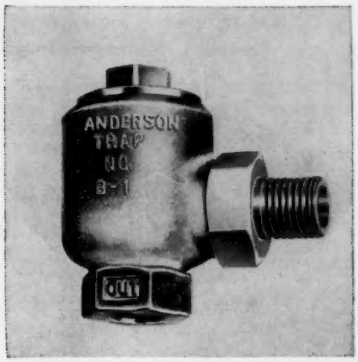
Circle 9527 opposite back cover.

Built-in union cuts trap installation costs

Designed into the inlet of thermostatic trap, union eliminates time involved in fitting pipe to a union, plus the cost of purchasing a separate union and materials. Maintenance is simplified since trap can be disconnected by loosening a single fitting.

Built-in union feature is optional

at slight extra cost on traps in both ½" and ¾" sizes. Traps have outstanding condensate and air removal characteristics due to special



Sizes ½ and ¾-inch, to 250 psi

phosphorus bronze and monel bellows with a constant spring load that opens instantaneously when contacted by cold air or condensate.

Downward flow design with no retaining passages prevents condensate from cooling and freezing in the trap, which is guaranteed against freezing for a period of two years.

Discharge capacity is up to 31,000 pounds of condensate per hour. Bodies are of heavy duty bronze or semi-steel. Traps are suitable for pressures up to 250 psi.

(Trap with built-in union is development of The V. D. Anderson Co., Dept. P&PSE, 1935 W. 96th Street, Cleveland 2, Ohio.)

Circle 9528 opposite back cover.

"Now, as I was saying last month before being interrupted — care should be taken at this point . . ."

LIGHTS
STAYS LIGHTED
PROVES IT'S LIGHTED

THE NEW
PEABODY "FP" (Flame-Proven)
GAS-ELECTRIC IGNITOR
IS: Safest
Most Positive
Most Dependable
Most Economical
Easiest to Service

Select this completely field-tested ignitor with integral flame proving as the heart of your automatic fuel burner light-off, remote control or safety sequence system. It performs safely and dependably under the most adverse ignition conditions. Don't be satisfied with a substitute... *you can't afford ignitor failure!*

Write Peabody, designer and manufacturer of ignitors, fuel burners, remote light-off control and safety sequence systems, for full information on this simple, rugged, compact ignitor for atmospheric or pressurized furnaces.

0-155

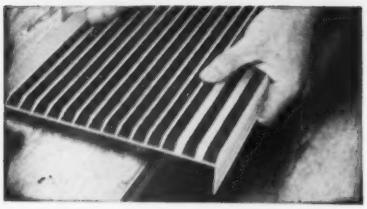
PEABODY ENGINEERING CORPORATION
232 MADISON AVENUE, NEW YORK 16, N.Y.
OFFICES IN PRINCIPAL CITIES
SUBSIDIARIES
In England: PEABODY LIMITED In Canada: PEABODY ENGINEERING CORPORATION OF CANADA LTD.

For more information, circle 9529 opposite back cover.

NEW DEVELOPMENTS

for effective
plant and equipment maintenance

NEW SAFETY TREAD



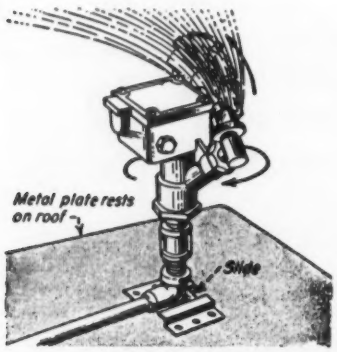
Super-Stairmaster is the new heavy duty aluminum safety stair tread that repairs and modernizes worn or slippery stairs now available from Wooster Products Inc., Wooster, Ohio.

The new abrasive "TRAFFIC-FLOW" design of the Super-Stairmaster has a magnetic-like grip which provides safe, sure traction on commercial—industrial—institutional stairs and is 100% effective under dangerous wet or oily conditions. Perfect safety for ladies' high heels is a feature of interest to managers of buildings open to the public. The treads are rugged and outwear concrete, stone or marble. Easily applied over all types of stairs. Cleans with once-over-sweeping or vacuum.

Approved and recommended by Safety Engineers. Guaranteed by Warranty Bond.

Complete information on Super-Stairmaster and the repair of stairs by return mail. Write Stairmaster, Dept. S-19, Wooster Products Inc., 100 Spruce St., Wooster, Ohio.

Circle 9530 opposite back cover.



COOL any building from the ROOF

Everyones knows how the sun, beating down on the roof of a building, descends into the interior. It makes the occupants uncomfortable and ruins merchandise.
Roof cooling is the answer. It can be used on any roof to keep the building cool or to save air conditioning costs. Best equipment for the job is Ruppright's Rotary Roof Cooler. Easily installed, it produces a thin film of water on the roof. This film evaporates but is continuously renewed by the slowly-rotating cooler making the roof cooler than the air.

ASK FOR FREE FOLDERS

RUPPRIGHT'S ROTARY ROOF COOLER

P.O. Box 43555 pl, Los Angeles 43, Calif.

Circle 9531 opposite back cover.

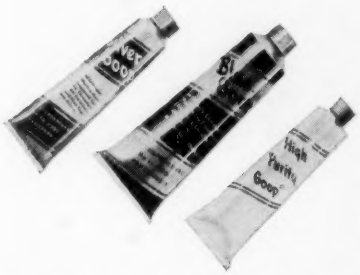
Anti-seize thread goop offered in three types

Prevents seizing and galling at high loading, high temperatures

Comprehensive line of anti-seize and lubricating compounds include three separate products: Blue goop, silver goop, and high purity goop.

Silver goop is formulated to prevent seizing and galling regardless of applied load on threaded parts, at temperatures up to 2100°F. It reduces take-up torque on threaded parts. Will not drip off red-hot surfaces, nor give off poisonous metal or oxide fumes at high temperatures. Resists water washout.

Blue goop is intended for use on titanium, stainless steel, steel, aluminum and high temperature alloys. Withstands temperatures up to 400°F. Impervious to water washout, most acids and all petroleum solvents.



Reduces take-up torque, resists washout

High purity goop is an anti-seize and sealing compound for titanium, stainless steel, aluminum and high temperature alloys at temperatures up to 400°F. Impervious to moisture, high voltage and cyclic thermal stress. Recommended for use wherever the prevention of product contamination is essential.

(Anti-seize thread compounds are development of Crawford Fitting Company, Cleveland 10, Ohio.)

Circle 9532 opposite back cover.

Pressure gages accurate? You can test them to make sure

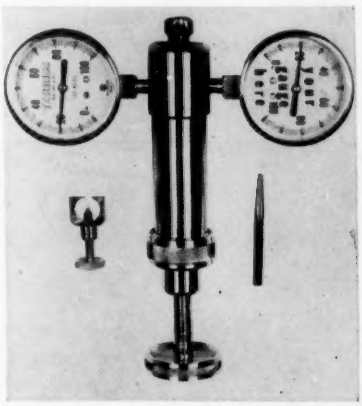
Low-cost instrument also has tools for correcting

Here is an easy and low-cost way to test pressure gages to make sure they are giving the right readings. This pressure gage tester even comes complete with tools for correcting faulty gages.

Its simplicity in design and operation makes it easy for any person to check his gage reading against that of the accurately calibrated gage which is part of the instrument.

Three models in chromium-finished brass and stainless steel are available for various pressures—up to 50 psi, 100 psi and 300 psi. For higher pressures, special units are available.

(Pressure gage tester is offered by Terriss Division, Consolidated Siphon Supply Co., Inc., 22 Wooster St., New York 13, N.Y.)



Just attach gage to this device, turn on pressure medium and compare reading to that of accurately calibrated gage

Circle 9533 opposite back cover.

NEW LITERATURE

for effective design and operation

Reviews of books and industrial bulletins describing equipment, supplies and services

Submersible rotary pumps for storage tank service

Cost-saving advantages of submersible rotary pumps in storage tank service are outlined in 4-page folder. Typical installations and specifications are included. Sier Bath Gear & Pump Co., Inc.

Circle 9534 opposite back cover.

Permanent magnet pulleys

For tramp iron removal, separation and cobbing operations, 6-page Bulletin 1022 explains how a highly oriented barium ferrite ceramic magnet material provides pulley performance equal to electromagnetic types at lower costs. Stearns Magnetic Products.

Circle 9535 opposite back cover.

Scotch Marine boilers extract more heat

Design and construction of automatic, horizontal Scotch Marine boilers are given in 12-page Catalog No. 120. Available in nine sizes, the oil- or gas-fired units feature a spiral "turbulator" which swirl hot gases through to extract more heat, increase fuel economy, and help keep boiler tubes clean. Lookout Boiler & Mfg. Co.

Circle 9536 opposite back cover.

No misalignment worries with this turbine

Single-stage, mechanical-drive steam turbine is centerline-mounted to minimize shaft misalignment due to thermal expansion. Two-page Bulletin 2001 describes the unit for requirements up to 1000 hp with inlet pressures up to 875 psig. Dean Hill Corp.

Circle 9537 opposite back cover.

Corrosion guide

Relative ability of metals, plastics and synthetic rubbers used in the manufacture of ball valves to resist the corrosive effects of 390 different fluids encountered in industry is listed in 8-page Corrosion Guide. Hydromatics, Inc.

Circle 9538 opposite back cover.

Air-cooled condenser specifications given

Four types of air-cooled condensers are discussed in Bulletin AC-102. Units included are those using propeller fans for horizontal or vertical air flow, and centrifugal fans for use with duct work. Sections are devoted to operation of these units under winter conditions. Halstead & Mitchell.

Circle 9539 opposite back cover.

Flexible hose designed for steam transmission

To counteract the ravages of live steam, flexible hose has pure bronze wire braid reinforcement and solid brass swaged fittings. Booklet features a description of the hose and its components with six tables of order numbers, types and sizes. Titeflex, Inc.

Circle 9540 opposite back cover.

Vertical magnetic drive

Vertical magnetic drives designed particularly for pump applications are described and illustrated in 2-page Publication 263. Drive can provide variable pumping speeds over a range from 0-1740 rpm. With variable speed pumping through the drive, pump speeds can be exactly matched to flow demands. A variety of sensing controls can be used to make pump operation automatic. Electric Machinery Mfg. Co.

Circle 9541 opposite back cover.

All-purpose angle valve

Universal angle valve for liquid level gages or instrument piping and general use is described and illustrated in Data Unit No. 361. The valve features single-piece forged body and bonnet flanges, simplified bolted bonnet, and reciprocating stem. Jerguson Gage & Valve Co.

Circle 9542 opposite back cover.

Packaged automatic boilers

Complete line of "Powermaster" Model 5 packaged automatic boilers is described and illustrated in 4-page bulletin. Included are high and low pressure types in 20 to 100 hp sizes, fired by oil, gas and combination oil-gas. Hot water units especially designed for forced circulation heating applications are also covered. Orr & Sembower, Inc.

Circle 9543 opposite back cover.

Flexible couplings — full line covered

Ten-page Bulletin No. 5103 describes complete line of flexible couplings, including those with flanges of zinc alloy and the large-size bushed couplings fitted with interchangeable tapered bushings. Engineering data are also given on space couplings with drop-center sleeves and couplings with a floating shaft to connect two shafts that cannot be brought close enough together to be connected by a single coupling. T.B. Wood's Sons Co.

Circle 9544 opposite back cover.

Motors and relays reference file

Quick reference file to AC and DC fractional-horsepower motors, tachometer generators and ultra-sensitive relays is given in 4-page Bulletin F-9765. Rated horsepower, dimensions, special features and typical applications are listed. Barber-Colman Company.

Circle 9545 opposite back cover.

Stationary compressor

Bulletin A-72/10M/12050-9 gives specifications on three basic models of semi-radially constructed stationary compressors ranging from 1385 cfm to 1948 cfm at 125 psi. Information on "package" design, components, inter-cooling, lubrication, motor mountings and accessories are included. Joy Manufacturing Co.

Circle 9546 opposite back cover.

Feedwater heaters for any size plant

Feedwater heaters for low-, intermediate- and high-pressure applications in plants with generating capacities that range from small to the very largest are featured in 16-page Bulletin YHT 102. Diagrams and cutaway drawings shown design features such as "Multilok" closure, copper alloy tubes welded into steel sheets, and all-welded shell. Yuba Heat Transfer Div.

Circle 9547 opposite back cover.

Low flow sliding gate seats

Low-flow sliding gate seats for regulators and control valves in ¼" through 3" sizes are described in Bulletin SRBc 2-60. Low-flow seats are used where initial requirements are for a low flow but later needs are for high flows; where strength of full line size valves is needed but low flow required; and to replace seats in an oversized valve body. OPW-Jordan Corp.

Circle 9548 opposite back cover.

AC generator voltage regulators

Four models of voltage regulators for AC generators and generator-exciters are described in Bulletin 3200. Three models have selenium rectifiers, and one has sealed silicon rectifier for corrosive atmospheres. Each regulator is of the tubeless magnetic-amplifier type. Its rugged, wholly static construction permits trouble-free operation in locations where conditions of high shock or vibration are encountered. Fidelity Instruments Corp.

Circle 9549 opposite back cover.

Double-duty limit switch

Double duty plug-in switch is featured in Data Sheet 168. Switch actually contains 2-circuit double-break switches which can control four isolated circuits. The roller lever actuator, when moved to the left, operates one of the basic switches and, when moved to the right, operates the other. Basic switches and terminals are mounted in rugged, diecast aluminum housings. Micro Switch, Division of Minneapolis-Honeywell.

Circle 9550 opposite back cover.

Warns of low level and cuts out fuel

Float action and electrode-operated functions are combined in a boiler safety device featured in 2-page Catalog Section D2.5-6. Device can be used to provide fuel cut-out and low alarm, dual fuel cut-out, or dual fuel cut-out and low alarm. The Reliance Gauge Column Co.

Circle 9551 opposite back cover.

How to reduce speed the modern way

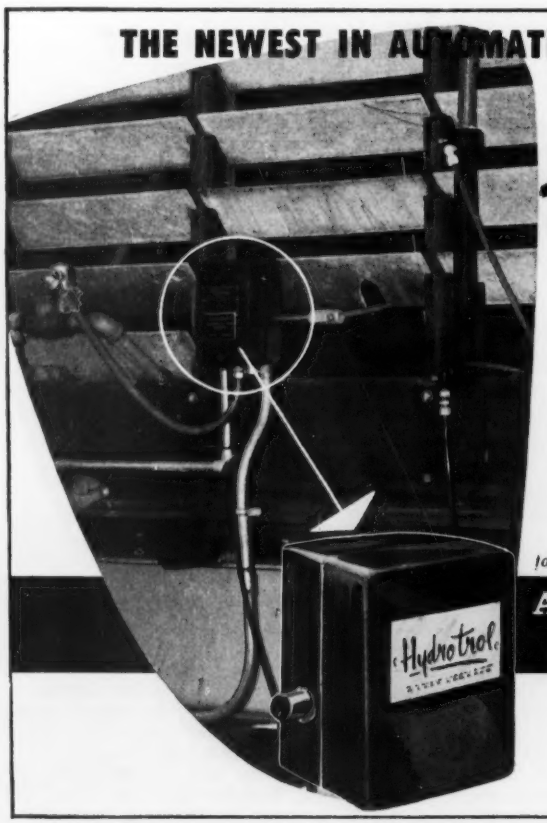
Modern methods of speed reduction with compact, shaft-mounted units in a wide range of sizes and horsepowers are described in 64-page Bulletin A692. Besides an expanded line of units for this use on driven machines, reducers for flange mounted, vertical shafts, right-angle drives and screw conveyor drives are detailed in specification charts and engineering drawings. Standard accessories include an overload release and built-in backstop, plus a heat exchanger for largest sizes. Dodge Manufacturing Corp.

Circle 9552 opposite back cover.

Compound solves industrial wiring problems

A polyvinyl-chloride compound and its industrial wiring applications in oil refineries, industrial, and chemical plants are discussed in 4-page Bulletin RCP-3001. Physical properties and electrical characteristics, along with AWG size, insulation thickness, outside diameter, and weight are also given. Rome Cable Corp.

Circle 9553 opposite back cover.



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Heller Laboratories, Inc. • Leonia, New Jersey

For more information, circle 9554 opposite back cover.

For economical cooling of gases, compressed air

For cooling gases or cooling and removing moisture from compressed air, Bulletin 130 describes after-cooler systems that are self-contained and independent of any large cooling water supply. Niagara Blower Company.

Circle 9555 opposite back cover.

Tachometer catalog

Nine tachometer indicators and six electric generators for tachometer service are described in 4-page catalog. Tachometers may be installed at the point of machine operation with speed indicators located at the operators station or at remote control stations where the operation of several machines may be observed at a central station. Madison Electric Products, Inc.

Circle 9556 opposite back cover.

Corrosion resistance chart

Corrosion resistance chart lists over 150 different chemicals and their recommended usage with ductile iron, iron, steel, 316 and 304 stainless, monel, brass, bronze, copper, aluminum and plastisol plastic. Chart also shows which gasket materials are needed for the various chemicals when quick couplers are used and which O-ring materials are needed when swivel joints are used. OPW-Jordan Corp.

Circle 9557 opposite back cover.

Industrial radiant heaters

Two types of radiant heaters for drying, heating, baking and curing are described in 14-page Bulletin PE-70. The illustrated booklet contains drawings showing assembly, charted operational information, installation pointers, and photographs of several actual installations of glass tubular and panel heaters which emit infrared energy. Corning Glass Works.

Circle 9558 opposite back cover.

Quick way to select dust collectors

Dust collector Bulletin 1828 features a pair of nomographs designed to simplify engineering calculations. One is provided as an aid to quick and accurate collector selection; the other simplifies the determination of anticipated efficiency. An example problem is established and carried through to completion as a guide to selection and efficiency determination procedures. American-Standard Corp.

Circle 9559 opposite back cover.

Specifies aluminum-bronze alloys

Chemical and physical properties of a series of special aluminum-bronze alloys are contained in revised 20-page Bulletin 33e. Nine major grades and heat-treated variations are described. The alloy possesses high resistance to metal-to-metal wear, abrasion, fatigue and corrosion and is non-magnetic and non-sparking. Ampco Metal, Inc.

Circle 9560 opposite back cover.

Can you use a psychrometric chart?

An expanded psychrometric chart that goes to 350°F (Dry Bulb Temperature) is available, ready to be placed in a notebook or mounted on the wall. The 16½" by 11" chart is backed up with a table of moist air enthalpy values and directions on how to use. J. O. Ross Engineering.

Circle 9561 opposite back cover.

Points the way to safety with combustion control

Control centers and systems for combustion automation and safety are thoroughly described in 22-page Bulletin No. C11. Starting sequence in easy-to-read chart form and listed design data round out the descriptions of each of nine systems. The Webster Engineering Company.

Circle 9562 opposite back cover.

Transmitter-receiver controls

Transmitter and receiver equipment for remote temperature control is featured in Bulletins 371, 371-1, 371-2. Series 200 transmitter transduces a temperature measurement into a 3 to 15 psi air pressure signal from a remote location. The signal may be sent to a receiver gauge which continually indicates the temperature measurement. The transmitter may also serve as a sensor for a remotely located receiver-controller. Powers Regulator Co.

Circle 9563 opposite back cover.

Fireproofing bulletin

Fireproofing system for beams, girders, columns, decks and ceilings is blend of virgin asbestos fibers, refined white mineral fibers with 100% inorganic binders. Bulletin F-10 tells how, mechanically applied, it forms a lightweight, fissured, continuous blanket without seams, joints or cracks. Columbia Acoustics and Fireproofing Co.

Circle 9564 opposite back cover.

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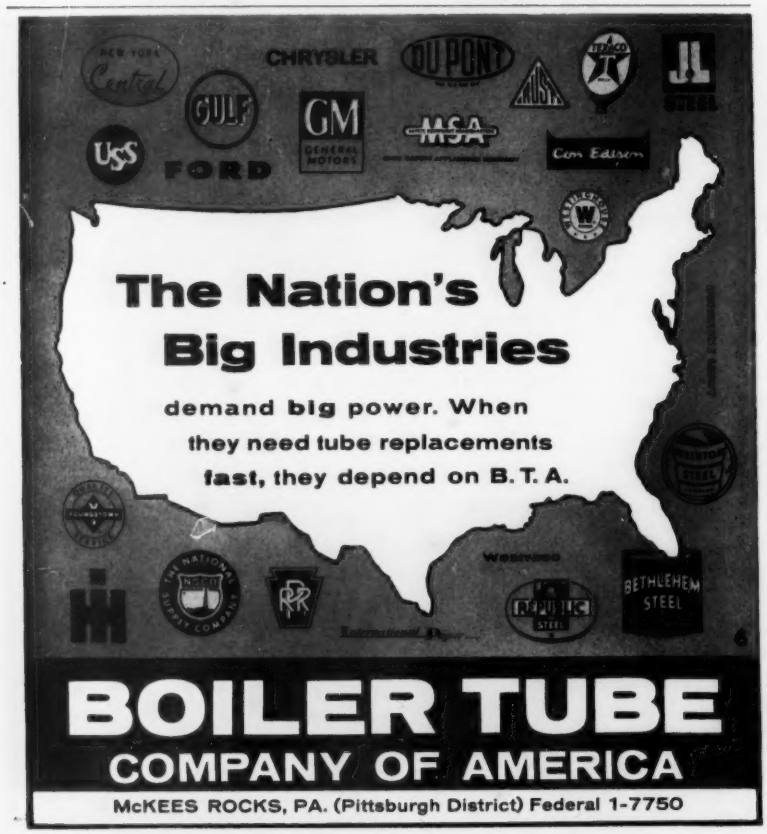


For more information, circle 9567 opposite back cover.

NEW LITERATURE

Hidden water cost

Liquid level controls for steam, gas and liquids are described in Bulletin 553-A. Proper valve selection and application can reduce "hidden costs" connected with the use of water in industry, and the bulletin focuses attention on the pitfalls in allowing water pressures to go unregulated or poorly regulated. It describes in detail how water reducing valves operate and gives complete information on proper sizing procedures. Leslie Company.

Circle 9568 opposite back cover.

Engineering manual on use of graphite heat exchangers

Impervious graphite heat exchangers manual features full-page illustrations, cutaways, diagrams, and design data. Also among the useful contents are charts, graphs, typical calculations, examples and specifications. Carbone Corporation.

Circle 9569 opposite back cover.

Mineral insulated cable

Safety Mineral Insulated Catalog is filled with general information on wiring system and has a section covering hazardous area uses which have been approved by Underwriter's Laboratories. Another section covers mineral insulation for instrumentation purposes. General Cable Corporation.

Circle 9570 opposite back cover.

Underfloor distribution systems

Underfloor distribution system components and assembly for power, telephone, and intercom are featured in Bulletin 517. Booklet describes standard and double-capacity duct and junction boxes for use in conventional concrete floor slab construction, with lift slabs, and in other special types of construction except cellular floors. National Supply Company.

Circle 9571 opposite back cover.

Packaged multi-zone air conditioners

Packaged multi-zone air conditioner Bulletin 8625 illustrates and describes both the single-zone basic unit and the multi-zone design. Simple line drawings are used to illustrate available arrangements and location of basic elements. Design features are itemized and described in detail, and basic specifications and dimensions are also tabulated. American-Standard.

Circle 9572 opposite back cover.

Determining stoker speed for traveling grates

MORTON ROSENSTEIN, Engineer, Jackson and Moreland, Inc., Boston, Mass.

This nomograph is designed for quick determination of stoker speed for traveling-grate-fired boilers, if the combustion rate, and length of the grate and height of the gate are known.

The chart may also be used for quick theoretical determination of grate width, grate length, range of grate speeds, range of adjustable gate heights, etc.

The COMBUSTION RATE is determined by dividing total Btu absorbed on the water or steam side of the boiler by the BOILER EFFICIENCY multiplied by the HEATING VALUE (Btu/lb) of coal and the AREA (sq ft) of grate surface:

Combustion Rate = Btu absorbed/hr ÷ (Efficiency) (Btu/lb) (sq ft)

The combustion rates shown on the chart are based on an average coal heat content of 12,000 Btu/lb and an efficiency of 80 percent. For greater accuracy at different Btu values and at other efficiencies, this scale may be changed by use of the above equation.

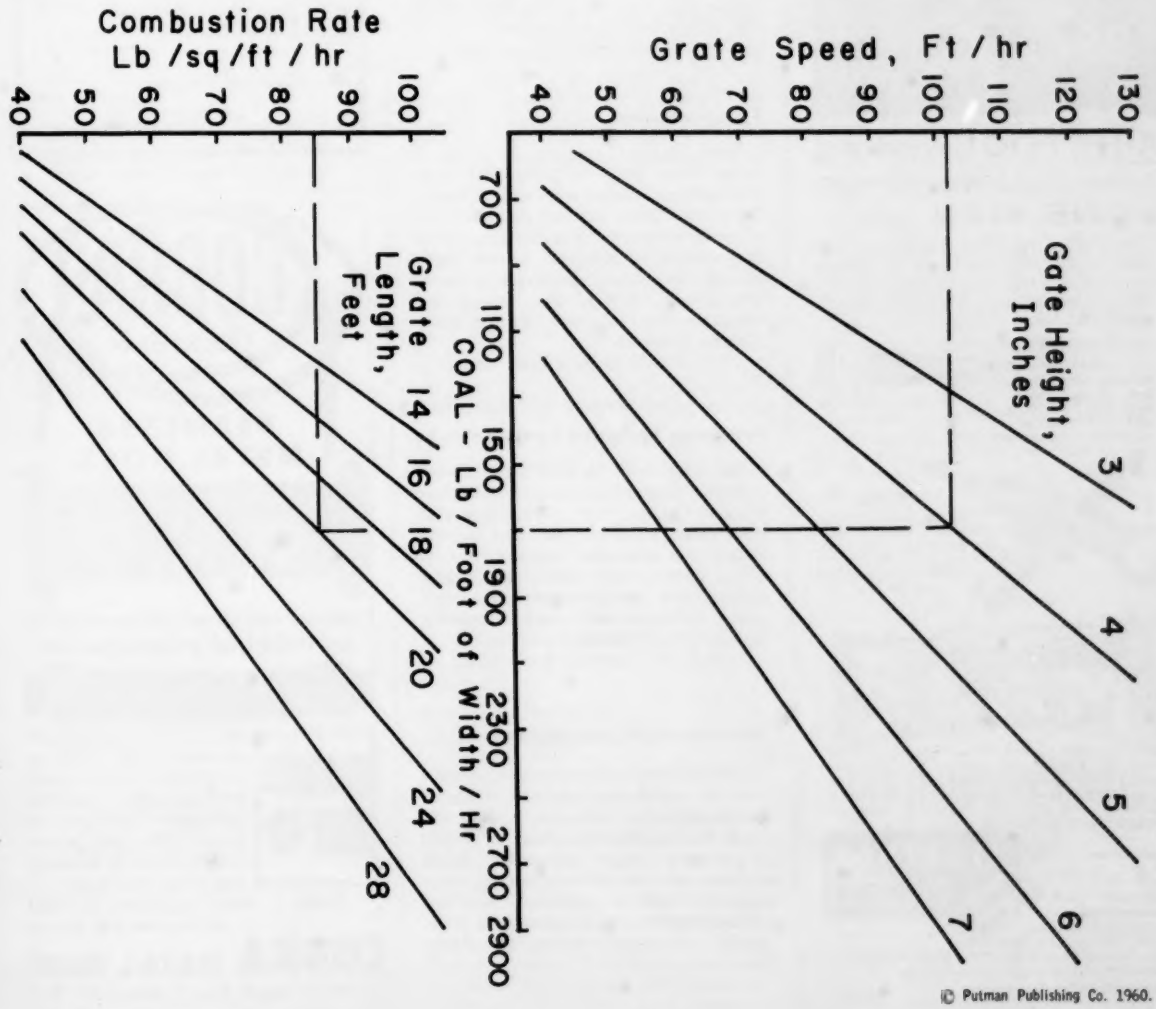
The chart is then based on the following equation:

Grate Speed = (Grate Length) (Combustion Rate) ÷ (Gate Height) (Coal Density)

COAL DENSITY was assumed to average 50 lb/cu ft for most coals.

Typical Example

At a COMBUSTION RATE of 85 lb/sq ft/hr on a 20-foot long grate, holding the gate height at 4 feet, the grate must be run at a speed of 102 ft/hr.



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AIRETOOL MANUFACTURING COMPANY SPRINGFIELD, OHIO

Circle 9573 opposite back cover.

NEW LITERATURE

Pump motors are submersible

Eight-page, full-color Brochure No. F-2000 contains full-length cutaway drawings showing construction details of line of submersible pump motors. Special features of these motors include water-lubricated bearings and windings hermetically sealed in stainless steel. U.S. Electrical Motors Inc.

Circle 9574 opposite back cover.

Abatement of hot corrosive dusts

Ways to lick air pollution problems in industry are subject of Bulletin 806. Illustrated application data describes how glass-bag filters provide virtually 100% efficiency in cleaning hot, corrosive gases in three plants representative of the cement and metallurgical industries. Temperature of gases filtered in one of the described installations reaches 550°F., just 50° under the maximum temperature capacity of the filters. Dracco Division of Fuller Company.

Circle 9575 opposite back cover.

Relay manual

Relay manual features 30 types of relays (with 1000 variations) for communications, computers, and industry. Publication gives detailed data with the aid of photographs, line drawings, tables and descriptive material on the many pile-up relay types, variations in spring arrangement, timing, coil voltage and contact ratings. Diaphlex Division, Cook Electric Company.

Circle 9576 opposite back cover.

Precision hermetic seals

Hermetic seals are illustrated, and complete dimensional specifications are given in Catalog 1259. A special section gives latest accepted glass seal nomenclature. To assist the designer who requires custom-made seals, the 28-page catalog also covers general manufacturing techniques and usage recommendations. Dage Electric Company.

Circle 9577 opposite back cover.

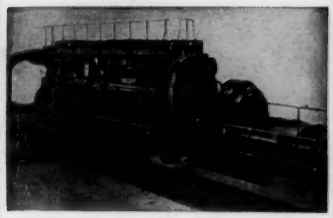
Thermocouple components

QuiK-Konnect thermocouple components for quick and easy connecting of thermocouples to extension wire is featured in Specification Sheet FS005-3. Components assure connection in a minimum amount of time, making them practical wherever periodic connection or disconnection of thermocouples is required. Minneapolis-Honeywell Regulator Co.

Circle 9578 opposite back cover.

DIESEL ENGINE GENERATOR SETS

Immediate Delivery from Inventory!



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Circle 9579 opposite back cover.

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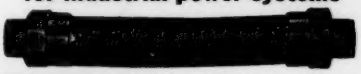

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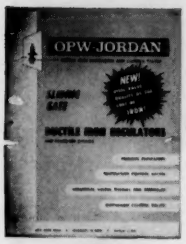
Circle 9580 opposite back cover.

NEW!



REGULATORS AND CONTROL VALVES NOW AVAILABLE IN DUCTILE IRON

This easy to use manual describes how you can get steel strength in regulators and control valves at the cost of iron . . . and, at considerable savings. It fully explains how ductile iron is produced, shows features, specifications, typical ranges of mechanical properties, and comparison tables on physical properties of cast steel, ductile iron, red brass and cast iron. This manual is also a condensed catalog describing the complete line of OPW-JORDAN products that are available to you in ductile iron. DI-1

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OPW-JORDAN 6013 WIEHE ROAD CINCINNATI 13, OHIO

Circle 9581 opposite back cover.

LOOKING FOR PUMPS?

- Read about the latest development in pumps.
- This story is in the New Developments section which starts on page 24.
- You'll find descriptions of many other types of plant and power services equipment there, too.

NEW LITERATURE

for effective plant and equipment maintenance

Welding accessories

Complete line of welding accessories and supplies is listed and described in 16-page Catalog EW-211. Included are headshields, grinding tools, goggles, cleaning tools, electrode holders, cable connectors, ground clamps, work-holding clamps, welding cable, protective clothing and gloves. Hobart Brothers Co.

Circle 9582 opposite back cover.

How to avoid shrinkage when grouting

Shrinkage is the principal cause of grout failure. How to avoid this shrinkage through use of properly applied nonshrink grout is subject of 16-page Bulletin E-1d. Common methods of grouting different types of equipment, and mixing and placing of grout and cold- and hot-weather grouting are outline and illustrated. The Master Builders Co.

Circle 9583 opposite back cover.

Designing for better wear of metals

Design Bulletin 40 is offered for a method of surface alloying which improves heat, wear and corrosion resistance of metals and refractories. Drawings show proper radii and blending of corners to ensure smooth, finished surfaces. Good thread design is also illustrated. Chromalloy Corp.

Circle 9584 opposite back cover.

Epoxy-polyamide repair material

By mixing two soft pliable mastics to form a strong, permanent material which, when cured, is tougher than concrete, you can repair almost any combination of materials according to 4-page "Plastic Mastic" Bulletin. The material will form a fine edge and can be feather-edged by using water or oil on the spatula. When cured, it can be sanded, filed or machined. Williamson Adhesives, Inc.

Circle 9585 opposite back cover.

NEW DE-LINE annunciator has 70% MORE ENGRAVING AREA for more precise trouble legends

Scam De-Line annunciators, your systems' sentry, now offers the new MAGNA-PLAC nameplate which provides 70% more engraving area.

The MAGNA-PLAC nameplate gives the engineer increased space to more accurately describe condition variations or to employ larger characters for greater visibility. It is interchangeable with standard Scam nameplates and optionally available *without extra charge.*

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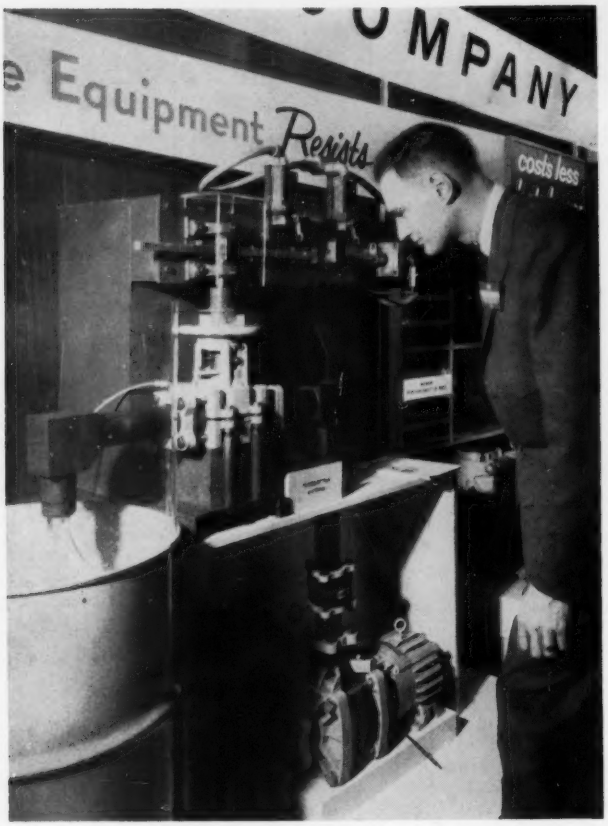
Circle 9586 opposite back cover.

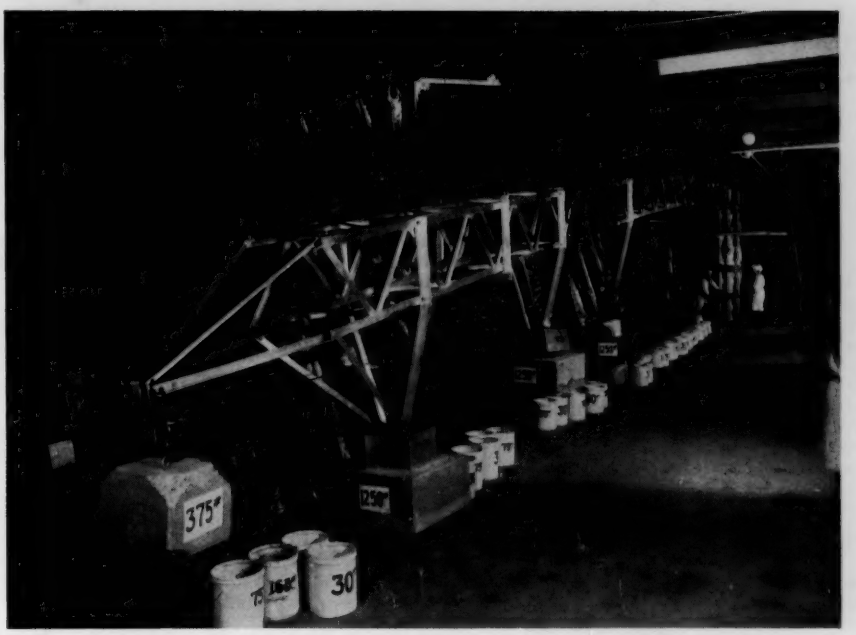
PHOTO NEWS



LOTS OF USE — and lots of abuse — were applied at the recent Chemical Show as this Karbate impervious graphite globe valve was put through its paces in a test rig at the National Carbon Co. booth. An automatic recorder counted a total of 22,027 opening and closing operations during the 46 hours the show was open — an average of 440 operations an hour. The valve is one in a line of graphite fittings, pipe and pumps for handling corrosive solutions.

Circle 9587 opposite back cover.

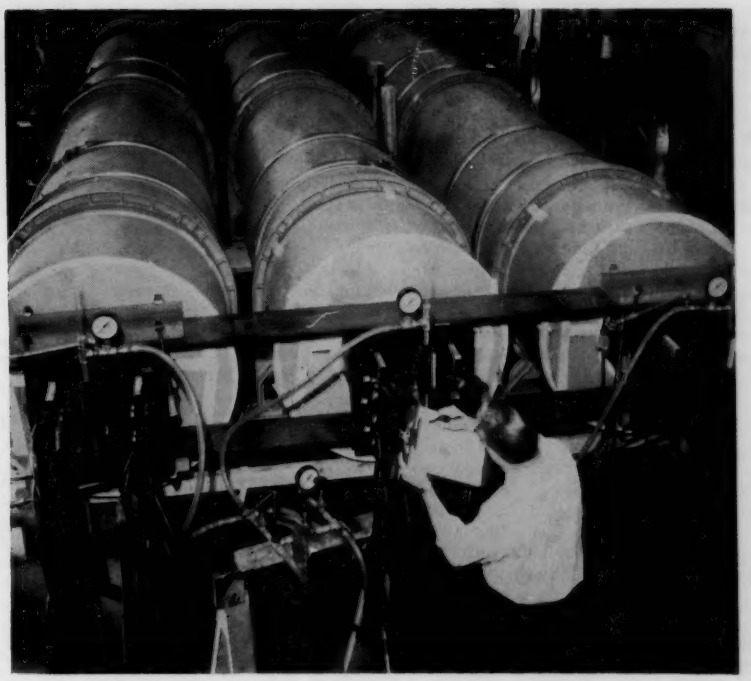
SPECIAL FLUORESCENT FIXTURES will be used to light the 6½-mile stretch of the famed Gaillard Cut in the Panama Canal. With the installation of the lighting system, it will be possible for two-way night-time transits to be effected through the Canal. The fixtures manufactured by Sylvania Electric Products Inc. will direct controlled light onto the canal banks where it belongs — and not into the pilot's eyes.



HURRICANE FORCES were simulated on an Alrectic lattice pole, distributed by Line Material Industries. Static loads simulated loading up to a maximum of 140 miles per hour. The pole, made of aluminum extrusions, weighs 1400 lb, approximately 20 percent the weight of an equivalent steel pole.

BIG ONES — AND LITTLE ONES, TOO — and all sizes in between. G. Dawson, application engineer, Goulds Pumps, Inc., demonstrates some of the features of a new ¾-inch chemical pump while sitting in the suction opening of a 30-inch centrifugal pump.

SPACE SAVINGS are offered by water-cooling isolated-phase generator bus. This 19-inch diameter circular aluminum bus, enclosed in a 40-inch aluminum duct had a 10,000-amp capacity. With the forced cooling 15,000 amps were kept flowing through the bus while temperature rise was held within allowable limits. The tests were conducted in the Chicago laboratory of Delta-Star Electric Div., H. K. Porter Company, Inc.



FOR YOUR CATALOG FILE

AIR CLEANING

Various products and systems for cleaning gases are presented in General Catalog File. Bulletins in this file describe and illustrate multiple-cyclone dust collectors, low-draft-loss chimney fly-ash arrestors, liquid-scrubber dust collectors, induced draft fans, fly-ash reinjection systems, smoke eliminators, controlled ratio dampers and special duct work. **The Fly Ash Arrestor Corporation.**

Circle 66 opposite back cover.

AIR CONDITIONING-REFRIGERATION

For removing excessive heat at its source, rotary roof cooler works equally well by itself or in support of air conditioning. Literature tells how these devices that spray a thin layer of water on the roof are ideal for all large buildings. **Ruppright's Rotary Roof Cooler.**

Circle 67 opposite back cover.

Listing company's complete line of industrial products, 24-page Bulletin B-5529 describes and gives basic ratings for air conditioning and air handling equipment, fluid drives, heat exchangers, surface condensers, steel boilers and related products. **American-Standard.**

Circle 26 opposite back cover.

BOILERS & STEAM GENERATION

Two-drum steam generators built to a design pressure of 725 psi are subject of Catalog 55-2. These units are adaptable to any type firing, and the catalog presents sectional drawing of four types. **The Wickes Boiler Co.**

Circle 01 opposite back cover.

Package steam generators ranging in capacity from 10,200 to 48,000 lb/hr are subject of 10-page Bulletin PSG-3. Units are available in 175, 250, 375 psig for single or multiple use. Design and construction details are given with dimensions and weights for various capacities. **Henry Vogt Machine Co.**

Circle 03 opposite back cover.

Refuse and waste stokers are presented in 12-page Bulletin No. 510. Sectional drawings are used to illustrate and describe spreader stokers with feeders and distributors to burn refuse fuels either separately or in conjunction with conventional fuels. Actual installations are pictured. **Detroit Stoker Company.**

Circle 04 opposite back cover.

Induced draft "Bifurcator" is a direct-motor-driven axial-flow fan in a divided housing that provides instant draft at starting and adequate draft during boiler operation. Bulletin DB-44, 20 pages, discusses advantages of induced draft, gives construction features of "Bifurcator", shows typical installations, and thoroughly tells with formulas, charts and tables how to select for oil-, gas- and cold-fired boilers. **DeBothezat Fans Division, American Machine and Metals, Inc.**

Circle 02 opposite back cover.

Glass-protected smokestacks that resist corrosive flue gases are subject of 8-page Bulletin SS-202A. Cost comparisons with conventional type stacks are given. Actual photographs demonstrate ease of installation. Drawings of available sections and accessories are included. **A. O. Smith Corp.**

Circle 06 opposite back cover.

Engineered boiler feed systems are described and illustrated in 20-page Catalog 55-D. Six types described include standard return systems, heat reclaim systems, spray-type return, "Pree-Heet" systems, and .03 and zero oxygen deaerating systems. Components in each system are pictured and specified. **Fred H. Schaub Engineering Company.**

Circle 07 opposite back cover.

For filling steam needs of operations which do not require a boiler with full modulating equipment, 8-page Bulletin 4010 discusses an economy line of water tube package boilers. The compact unit's built-in controls are operated by either temperature or pressure. **Vapor Heating Corp.**

Circle 08 opposite back cover.

Instructions for operating spreader stokers are given in 5-page Section C-3. Subjects include: preparation for starting, cleaning fires, taking boiler and stokers out of service, greasing and oiling, and periodic inspection. A list of stoker ailments, causes and cures is presented in easy-to-read form. **Bituminous Coal Institute.**

Circle 09 opposite back cover.

BUILDING MAINTENANCE

Two types of safety grating are illustrated, specified and described in 24-page Catalog 5911. "Grip-Strut" type available in steel, aluminum and stainless steel features one-piece construction. The other is of I-beam and flat-bar construction, projection welded for greater rigidity and strength. **Products Division, The Globe Company.**

Circle 11 opposite back cover.

Modernizing plant stairs that are worn and slippery is subject of 4-page Brochure M-160. Available lengths and widths of safety treads to fit all steps and landings are given. Easy method of installing on any stair material is illustrated. **Wooster Products, Inc.**

Circle 12 opposite back cover.

Every grating need can be met with products described and listed in 24-page General Grating Catalog. Resplendent with application photographs, the catalog also shows each grating product in a schematic drawing. A large-size table lists safe loadings for steel gratings. **Irving Subway Grating Co., Inc.**

Circle 13 opposite back cover.

ELECTRICAL DISTRIBUTION

Heavy-duty transmission and distribution equipment is listed and priced in 300-page catalog. Detailed specifications are given for every piece of equipment, and an "Easy Estimator" is included in each of 25 sections for convenience. A special section provides motor current ratings plus generally accepted control definitions. **Continental Electric Equipment Co.**

Circle 19 opposite back cover.

Guide to electrical distribution systems is given in 60-page Speedfax catalog which provides fast-reference form to select equipment for industrial and commercial use. Three sections provide extensive information on molded-case circuit breakers, engineered substation transformers and switchgear. **I-T-E Circuit Breaker Co.**

Circle 20 opposite back cover.

For supporting cables and wires, two types of trays or tube raceways — the ladder type and the basket, small-opening type — are fully described and specified in 28-page Catalog 5912. A complete line of fittings and accessories in steel or aluminum is available for speedy installation. **Products Division, The Globe Company.**

Circle 21 opposite back cover.

ELECTRICITY GENERATION

Turbine-driven generator sets are listed and specified in four-page Bulletin 140-B. Sets are rated 3.75 to 62.5 kva, and the steam turbine features constant speed governor, excess speed safety trip, carbon ring glands, and connection to generator by flexible coupling. **Coppus Engineering Corp.**

Circle 27 opposite back cover.

A guide to selection and installation of standby electric plants is given in 8-page File Folder 32C/ON. Diesel- and gasoline-engine-driven units are available in ratings of 3 to 230 kw and 1 to 170 kw respectively. Automatic controls for transferring load to these units are also described. **D. W. Onan & Sons Inc.**
Circle 28 opposite back cover.

EQUIPMENT MAINTENANCE

For testing electrical insulation, dielectric test sets supply and measure DC voltage up to 100kv and output current up to 20ma. Sixteen-page Bulletin 32 tells how to use and describes two models for nondestructive tests on electrical insulating materials, individual insulation structures and insulation of electrical equipment such as cable, rotating machinery, dry-type transformers, switchgear, capacitors, resistors and communication equipment. **James G. Biddle Co.**
Circle 30 opposite back cover.

Portable high-current test instruments for testing and calibrating take the guesswork out of electrical protection of motor starter overload relays, circuit breakers, fuse links, meters, current transformers, and oil circuit reclosers. Four-page Bulletin #356 discusses the use of these instruments. **Multi-Amp Electronic Corp.**
Circle 32 opposite back cover.

Non-destructive field testing service is explained in 4-page brochure. A suggested list of equipment needing testing is given, with illustrations of typical in-plant inspections. Magnetic particle, fluorescent magnetic particle ultrasonic "sounding", and fluorescent penetrant test systems are described. Locations of field service offices are given. **Magnaflux Corporation.**
Circle 33 opposite back cover.

All kinds of electrical testing equipment are listed in General Catalog containing specification sheets and bulletins on each instrument. Equipment includes those for testing resistance and measuring dielectric strength of insulation in circuits, panels, motors, switches, circuit breakers, cable and wiring. **Associated Research.**
Circle 34 opposite back cover.

To make sure that oil-circuit reclosers meet specifications, portable test sets will check recloser operating coil size, sequence of operation, and time-current characteristics. Eight-page Bulletin SB-OCR-1 describes three units rated 4, 7.5 and 15 kva. **Multi-Amp Division, Multi-Amp Electronic Corp.**
Circle 35 opposite back cover.

Tube cleaners and expanders and other precision-made maintenance tools are illustrated and specified in 8-page Bulletin No. 58. Illustrations show how to use the equipment, and description of each type tells where and when to use. **The Airetool Mfg. Co.**
Circle 36 opposite back cover.

FANS & BLOWERS

Resistance to corrosion is offered by line of fiber-glass duct fans at a cost lower than that of comparable metals. Bulletin A-116-A gives performance data and pictures installations of these units. **Hartzell Propeller Fan Co.**
Circle 40 opposite back cover.

Engineering data on roof ventilators are presented in 16-page Bulletin A-112C. Section is devoted to fans used in these units, and descriptions of six types of ventilators follow. Two pages of tables give air delivery rates for all models. **Hartzell Propeller Fan Co.**
Circle 41 opposite back cover.

HEAT EXCHANGERS

Heat transfer equipment in custom designs for individual applications is subject of 20-page Bulletin HE-8. Basic types are shown with sectional drawings. Examples of film type exchangers, waste heat boilers, high pressure/temperature exchangers, and exchangers of special alloys are illustrated and described. **Henry Vogt Machine Co.**
Circle 45 opposite back cover.

INSTRUMENTS & CONTROL

You name it, and this 56-page catalog describes an automatic control to safeguard it. Catalog 860 lists over 200 products consisting of pressure, temperature, liquid level controls, relays and mercury switches. Applications include something for practically every plant and power services operation. **The Mercoid Corporation.**
Circle 48 opposite back cover.

Self-powered temperature regulators use no compressed air or electricity. Bulletin No. 620-2, 10 pages, describes line of these controllers available in a wide variety of materials of construction. Three pages are devoted to "how to size." **Sarco Company, Inc.**
Circle 49 opposite back cover.

How high the frequency? Instruments with tuned steel reeds will indicate frequency of alternating current. Bulletin 32, 20 pages, fully explains a wide variety of these frequency-meter models and accessory equipment. **James G. Biddle Co.**
Circle 50 opposite back cover.

No matter what the speed, there's a tachometer described in 20-page Bulletin 35 to measure it. A wide selection of ranges and sizes are available in 15 models. In the descriptions of many models, actual-size dial faces are pictured. Descriptions of accessories and a tester are included. **James G. Biddle Co.**
Circle 51 opposite back cover.

Magnetic and motorized valves for air, water, gas, steam, oil and refrigerants are listed and described in 24-page Catalog No. V-58. Various types are shown for each application, and the catalog has two large flow charts for determining valve size. **The Mercoid Corporation.**
Circle 52 opposite back cover.

Direct-operated solenoid valves for automatic or remote flow control of liquids and steam up to 400°F are subject of 12-page Bulletin V-6. Six types are illustrated and described. Accessories and capacity tables are presented. **The Johnson Corp.**
Circle 53 opposite back cover.

Reliable protection of machinery where stopping or slowdown may cause damage is provided by "Roto-Gard" device which indicates stopping or drop in speed. Four-page Bulletin RG-21 specifies and describes installation of this low-cost protection device. **The Bin-Dicator Company.**
Circle 54 opposite back cover.

If you have a recording instrument — no matter which make — there's a chart for it listed in this 1960 stock list of circular and strip charts. The 92-page brochure tells which to use for each manufacturer's model number. **Technical Sales Corp.**
Circle 55 opposite back cover.

To obtain your copy of catalogs described in this section, circle corresponding numbers in section listed under "Catalogs" on the Reader Service Card opposite back cover.

CATALOGS FOR YOUR FILES

INSTRUMENTS & CONTROL

All kinds of recording instruments for electricity and speed measuring are described and illustrated in Product Catalog. Instruments specified include AC and DC ammeters and voltmeters, wattmeters, tachometers, and units for measuring kva and kvar, power factor, frequency, pressure, vacuum, and position and motion. Accessories and attachments are also listed. **The Esterline-Angus Co., Inc.**

Circle 56 opposite back cover.

For steam and water service, 46-page Engineer's Manual serves as a guide in selection of automatic controls. It presents typical applications such as domestic hot water, fuel oil heaters, instantaneous heat exchangers, storage heaters, jacket and tube cooling, pressure reducing and two-temperature hot water, and provides practical, workable systems for each. **The Powers Regulator Co.**

Circle 57 opposite back cover.

To obtain your copy of catalogs described in this section, circle corresponding numbers in section listed under "Catalogs" on the Reader Service Card opposite back cover.

INSULATION, THERMAL

Full line of over 30 industrial insulations is easy to select from with the aid of selection charts presented in 24-page 1960 Catalog. Illustrations of typical installations, properties and specifications of insulations for service from subzero to 1900°F are presented. Types include spun mineral wool, calcium silicate and 85% magnesia. **Baldwin-Ehret-Hill, Inc.**

Circle 59 opposite back cover.

How to make insulation effective through the use of mastics, adhesives, coatings and flashings is fully described in General Catalog. Properties and directions on how to use (in step-by-step illustrated descriptions) are given on over-a-hundred products for commercial, power, process, cold storage and marine applications. **Benjamin Foster Company.**

Circle 60 opposite back cover.

High-temperature insulation is made of hydrous calcium silicate for low k-factor, rugged service at temperatures to 1200°F. Bulletin IN-169A, 20 pages, gives properties of full size range in easy-to-read tables. **Johns-Manville Corporation.**

Circle 61 opposite back cover.

Special long-fiber asbestos makes it exceptionally suitable as an insulation material. Called "Amosite", it is subject of 40-page "Unibestos" pipe insulation catalog. Besides giving all the properties of this material, the catalog also has sections on "How to Select Insulation" and "Selecting the 'J' Factor." **Union Asbestos & Rubber Company.**

Circle 62 opposite back cover.

Already-jacketed, calcium silicate insulation comes with built-on aluminum jacketing for fast, easy, clean installation. Bulletin IN-217A, four pages, gives specifications and tells how to install. **Johns-Manville Corporation.**

Circle 63 opposite back cover.

All kinds of insulation products are described and specified in Product Catalog IN244-A, 54 pages. The booklet is divided into sections according to application (industrial & high temperature; plumbing, heating & air conditioning; refrigeration; fire brick & refractories; finishing & weatherproofing; and miscellaneous). Specifications on each product for these applications are given in easy-to-read form. **Johns-Manville Corporation.**

Circle 64 opposite back cover.

LUBRICATION

How do you want to oil it? Catalog No. 10 with 34 pages lists a variety of lubrication devices for handling a multitude of oiling jobs. Photographs, drawings, specification tables and descriptive paragraphs round out the data on a line of oil cups, oiling systems, dispensers, valves and flow indicators, oil gages and filters, and chain oilers. **Oil-Rite Corporation.**

Circle 70 opposite back cover.

Forced-feed lubricator information is given in 42-page catalog. Engineering data, principles of operation, feed and mounting arrangements are discussed along with facts about the various lubricator models. A centralized lubrication system and an alarm for safeguarding lubrication systems are also included. **Manzel.**

Circle 71 opposite back cover.

Non-fluid oil for centralized and one-shot lubrication systems is subject of four-page Bulletin No. 522. The bulletin discusses centralized lubrication systems in detail and lists lubricants recommended for various applications. **New York & New Jersey Lubricant Co.**

Circle 72 opposite back cover.

MANAGEMENT & ENGINEERING

For supporting castable linings in cyclones, hoppers, pipelines, flues, furnaces and stacks, a cellular steel mesh of hexagonal design prevents lining slump and retards erosion, cracking, blistering, pitting or collapse. The product can be used to support concrete floors subjected to heavy traffic. Two "Grid-steel" catalogs fully describe two types of this steel framework. **Irving Subway Grating Co., Inc.**

Circle 31 opposite back cover.

Custom fabrication of sheet metals, plates and light structurals is the job of this manufacturer. Bulletin No. F4, 38 pages, shows facilities and a variety of equipment fabricated there. Equipment shown includes ducts, turbine lagging, insulation jacketing, special hoppers, intake louvers, electrical enclosures, instrument cubicles, machine guards, motor and pump bases, concrete forms, tanks and heat exchangers. **The Kirk & Blum Manufacturing Co.**

Circle 75 opposite back cover.

MATERIAL HANDLING & STORAGE

"The eyes of the bin" aptly describes two types of bin-level indicators for all bulk materials. Catalog BD-15, 20 pages, tells about a diaphragm type and a rotating-paddle type for both low and high level indication to prevent over-flowing of bins, clogging of conveyors, choking of elevators and damage to machinery. Flow diagrams, charts and cut-away drawings round out descriptions of various models. **The Bin-Dicator Company.**

Circle 78 opposite back cover.

PACKINGS AND GASKETS

Simplified packing application chart is presented in 84-page mechanical packing and seal Catalog 60. Products are also classified by industry use, and the catalog is divided into sections devoted to the various applications. Boiler-room tools, gage glasses, belt dressings, cutting compound and penetrating oils are also listed. **A. W. Chesterton Co.**

Circle 81 opposite back cover.

Over twenty types of asbestos packings are pictured and described in four-page catalog, Form 76-178. Types include square-braided plaited packings, braid-over-braid and high-pressure packings, gasketing tape, rope, valve stem and sheet packings, and woven tape. **Union Asbestos & Rubber Company.**

Circle 80 opposite back cover.

PIPING, VALVES & SPECIALTIES

One trap for pressures to 600 psi eliminates need to stock an assortment of different steam traps for various pressure and condensate loads. This "Thermo-Dynamic" trap, described in Bulletin 257-B, works on a principle which uses kinetic energy of steam to close the valve. There is only one moving part.

How it works is demonstrated in the bulletin. **Sarco Company, Inc.**
Circle 82 opposite back cover.

Metal hose connectors in carbon and stainless steel are shown in 8-page Catalog 539. Suggested applications are listed. Charts give installation data for each pipe size and length of connector and nipple. Available models in each material are illustrated. **Cobra Metal Hose.**
Circle 83 opposite back cover.

Traps, separators, strainers are covered in 4-page Bulletin 811. Entrainment and line separators, and exhaust leaks are shown. Several types of traps are described, including a unique combination float and thermostatic trap that discharges below saturation temperatures. Selection and capacity charts for steam, air and hot condensate are included. **Wright-Austin Co.**
Circle 84 opposite back cover.

Valve selection is content of 20-page brochure, "Choosing the Right Valve." Intended mainly as a refresher in application of basic valve designs, it illustrates and discusses service characteristics of gate, globe and check valve variations. **Crane Co.**
Circle 85 opposite back cover.

Forged steel valves, fittings in complete range of sizes and pressure classes are described in 430-page Catalog F-10. Valves, fittings, and flanges for general refrigeration service are also covered. Engineering section includes pressure-temperature ratings, names of parts, maintenance information. **Henry Vogt Machine Co.**
Circle 86 opposite back cover.

Control valves and other specialities are listed in extensive product catalog. Products described, specified and illustrated include: sliding-gate regulators, ductile iron regulators, pressure-reducing valves, temperature-control valves, sampling valves, and a wide variety of nozzles, valves, fittings, swing joints, and manholes. **OPW-Jordan Corporation.**
Circle 87 opposite back cover.

How good trapping can save you money leads off a 50-page Steam Trap Book. Other features of this educational handbook include discussion of the inverted bucket principle, and descriptions of open-float, thermostatic, side and bottom inlet, forged steel, compound, air and air relief types. Capacity chart, pipe sizing data, and how to select for various applications are also given. **Armstrong Machine Works.**
Circle 88 opposite back cover.

Flexible metal hose for high temperature and pressure and corrosive applications is pictured and specified in 6-page Data Sheet SSDS-625. Standard fittings and connectors for the unbraided, single- and double-braided stainless steel hose are also presented. **Allied Metal Hose Co.**
Circle 89 opposite back cover.

In tough jobs such as boiler feed water, erosive slurries, high-pressure steam and water and soot-blower applications, S-valves incorporate exclusive features for long life under these conditions. Bulletin S-1 explains these features and gives specifications. **Conoflow Corp.**
Circle 91 opposite back cover.

PNEUMATIC POWER

"Products for the Plant" is title of 8-page Form 223 which describes and pictures line of compressors, pumps, condensing equipment, vacuum equipment, and air hoists. **Ingersoll-Rand Co.**
Circle 74 opposite back cover.

POWER TRANSMISSION, MECHANICAL

V-belt drives offering extreme compactness and reductions in cost are described in 40-page Bulletin A69-5A. Data and tables for selection and operation of standard drives and for designing and operating special drives are included. Horsepower ratings, service level tables, and specifications for belts and sheaves are given. **Dodge Mfg. Corp.**
Circle 90 opposite back cover.

PUMPS

Centrifugal and turbine type pumps are described and illustrated in 4-page condensed bulletin. Types covered include: single and multiple stage, flexible and close coupled, horizontal and vertical. **Aurora Pump Division, The New York Air Brake Company.**
Circle 79 opposite back cover.

SAFETY & FIRE PROTECTION

How to select warning signals is subject of 8-page fold-out Bulletin No. 100. The bulletin graphically points out where and what type signals should be used in various locations and types of plants. Basic principles and signal products are explained. **Federal Sign and Signal Corporation.**
Circle 76 opposite back cover.

Protective gloves and sleeves and other equipment for use in industrial and utility electrical work are listed in 32-page "Linemens' Protective Equipment" Catalog. Each product is described and illustrated, and the catalog gives clear instructions on proper care and use. **Charleston Rubber Co.**
Circle 93 opposite back cover.

Work clothes for every need are shown in 12-page Catalog No. 201. Types described include coveralls, service coats, matched outfits, acid and caustic resistant clothes, hooded coveralls, inner suits and flameproof clothes. **M. Setlow & Son, Inc.**
Circle 92 opposite back cover.

Answer to enclosure problems is given in "Safe-Gard" Bulletin. These expanded metal partition panels provide a method for easier, simpler enclosing or separating of equipment, storage or tool rooms, conveyors, and stairs. They also can be used as explosion cages. **Products Division, The Globe Company.**
Circle 94 opposite back cover.

Interior fire-fighting equipment is presented in 1960 Catalog, 28 pages. Up-to-date engineering facts and specifications are given on automatic sprinklers, high- and low-pressure CO_2 systems, smoke detection systems, dry chemical systems, foam systems, portable extinguishers and fire hose systems. **The Fyr-Fyter Company.**
Circle 95 opposite back cover.

WATER SUPPLY & TREATMENT

Solution to problem of scale and corrosion control is presented in "Glucosate" circular — which is in the form of a telescoped sheet of eleven different drums. Each "drum" is direct to some special use in correcting and controlling scale and corrosion. **D. W. Haering & Company.**
Circle 77 opposite back cover.

Over 40 test sets for making water analyses are described in two Water Testing Equipment bulletins. One lists all the sets, telling which equipment and chemicals it contains. The other tells how and why it is necessary to run the various tests. **The Bird Archer Co.**
Circle 96 opposite back cover.

For making brine, two models of a brinemaking unit use an exclusive device which creates exceedingly high brine make-up rates. It completely eliminates use of gravel supporting beds or other pictures and describes the units. **Morton Salt Company.**
Circle 97 opposite back cover.

For accurate feeding of water treatment chemicals, proportioning pumps and packaged chemical-feeding units will feed systems up to 1500 psig. Four-page bulletin describes all components of these units. **The Bird-Archer Company.**
Circle 98 opposite back cover.

Accurate salt inventory in underground brine tanks is possible with "Levetrol" system. Eight-page bulletin fully describes the system and tells how it controls the liquid level automatically and in proportion to salt consumed. **Morton Salt Co.**
Circle 99 opposite back cover.

ADVERTISERS' INDEX

When an asterisk (*) appears after a name, the advertisement does not appear in this issue but has appeared within the previous three months.

A

Aero Research Instrument Company, Inc. *
Airetool Manufacturing Company 34
Allen-Sherman-Hoff Company, The ..... 2nd Cover
Armstrong Machine Works ..... *
Associated Laboratories 30
Associated Research Incorporated ..... *
Aurora Pump Division, The New York Air Brake Company ..... *

B

Baltimore & Ohio Railroad 11
Barksdale Valves, Pressure Switch Division ..... *
Biddle Co., James G. 8
Bin-Dicator Co., The ..... *
Bird-Archer Company, The ..... *
Bituminous Coal Institute ..... *
Boiler Tube Company of America 32

C

Cambridge Instrument Co., Inc. ..... *
Chicago-Wilcox Mfg. Co. ..... *
Cobra Metal Hose 34
Coppus Engineering Corp. 22
CREI Atomics 31

D

Detroit Stoker Company, Division of United Industrial Corporation 12

E

Elliott Company, Roto Plant 4
Esterline-Angus Company, The 6

F

Federal Sign and Signal Corporation 21
Fly Ash Arrestor Corporation ..... *
Foster Co., Benjamin, Division of Amchem Products, Inc. 9

G

Globe Company, The, Products Division 10
Graphic Systems ..... *

H

Haering & Co., Inc., D. W. ..... *
Hartzell Propeller Fan Co., Div. of Castle Hills Corp. 22

I

Ideal Industries, Inc. ..... *
Irving Subway Grating Co., Inc. ..... *

J

Johns-Manville ..... *
Johnson Corporation, The 21

L

Lake Chemical Co. ..... *
Lester Laboratories, Inc. ..... *
Link-Belt Company ..... *

M

Magnesium Company of America ..... *
Martin Engineering Company ..... *
Mercoid Corporation, The ..... *
Morton Salt Company, Industrial Division ..... *
Multi-Metal Wire Cloth Co., Inc. 26
Murphy & Co., Inc., Jas. A. ..... *

N

National Boiler Protector Co. ..... *
National Conveyor & Supply Company *
National-Porges Co. ..... *
New York & New Jersey Lubricant Company ..... *
Niagara Blower Company 25

O

OPW-Jordan 35

P

P-W Industries, Inc. ..... *
Peabody Engineering Corporation 27
Penberthy Manufacturing Co., Division of Buffalo-Eclipse Corporation ..... *
Pick Mfg. Co. 23
Powers Regulator Company, The 3
Precision Multiple Controls 23

R

Rupprecht's Rotary Roof Cooler 28

S

Sarco Company, Inc. ..... *
Scam Instrument Corp. 35
Schaub Engineering Co., Fred H. ..... *
Schoonmaker Company, Inc., A. G. 34
Sentry Equipment Corp. 32
Smith Corporation, A. O. 25

T

Thermo Electric Co., Inc. ..... *
Truax-Traer Coal Company ..... *

U

Union Asbestos and Rubber Company, Fibrous Products Division 7
United Electric Coal Companies, The ..... 3rd Cover

V

Vapor Heating Corporation ..... *
Vogt Machine Co., Henry ..... 4th Cover

W

Wooster Products Inc. 28
Wright-Austin Company ..... *

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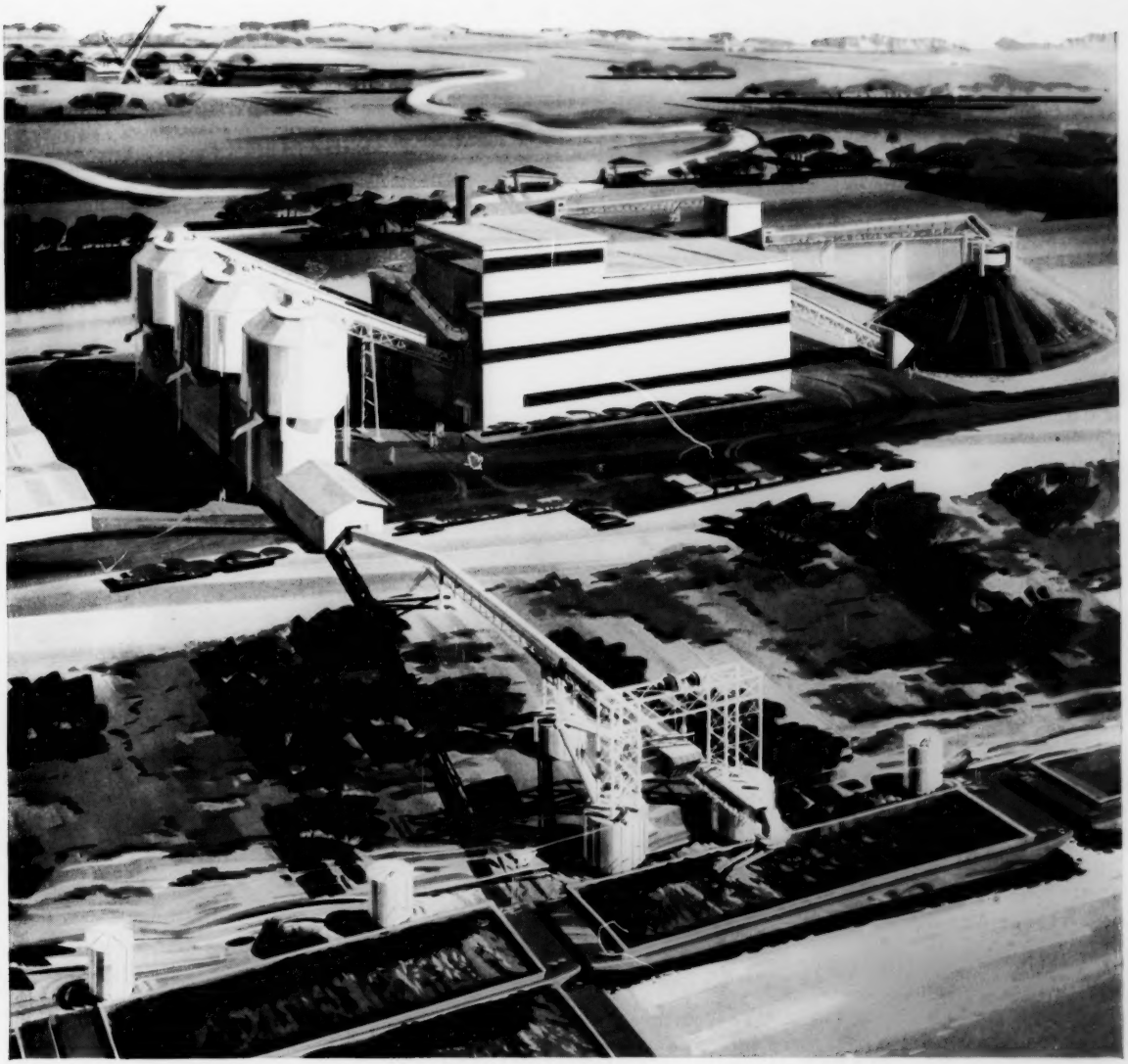

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